

# Australasian Plant Conservation

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Beyond parks and reserves – the importance of conservation on private land

Conserving the rare flora of the Granite Belt in Southern Queensland

The Tasmanian Land Conservancy: protecting Tasmania's biodiversity  
through conservation on private land

Promoting plant conservation on leasehold land in the Australian Capital Territory

Significant Plant conservation on Bush Heritage reserves – the meaning of new discovery

Getting Wild about Macadamias:  
going it alone - passion, persistence and the good will of many

And much much more ...

SPECIAL THEME: MECHANISMS FOR PLANT CONSERVATION ON PRIVATE LAND



**ANPC National Office**

GPO Box 1777  
 Canberra, ACT 2601, Australia  
**Ph:** (02) 6250 9509  
**Fax:** (02) 6250 9528  
**Email:** [anpc@anpc.asn.au](mailto:anpc@anpc.asn.au)  
**Web:** <http://www.anpc.asn.au>

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**Australasian Plant Conservation****Editor**

Selga Harrington

**Editorial Team**

Rosemary Purdie, Sally Jacka, Paul Adam,  
 Adrian Fethers, Bob Makinson, Sue Mathams,  
 Mark Richardson and Zoe Smith.

**Layout & Graphic Design**

Siobhan Duffy

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**New Zealand Plant Conservation  
Network**

**President** Philippa Crisp

**Secretary** John Sawyer

PO Box 5086 Wellington, New Zealand.

Email: [info@nzpcn.org.nz](mailto:info@nzpcn.org.nz)

Web: [www.nzpcn.org.nz](http://www.nzpcn.org.nz)

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**Front cover:** Volunteers assist with  
 monitoring of threatened flora at the  
 Vale of Belvoir Reserve, Tasmania.  
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## Contents

|                                                                                                                                                             |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| From the editor.....                                                                                                                                        | 2  |
| Significant Plant conservation on Bush Heritage reserves – the meaning of new discovery<br>by <i>Paul Foreman</i> .....                                     | 3  |
| Conserving the rare flora of the Granite Belt in Southern Queensland by <i>Paul Donatiu</i> .....                                                           | 5  |
| Getting Wild about Macadamias:going it alone - passion, persistence and the good will of many<br>by <i>Maria Matthes</i> .....                              | 7  |
| The Tasmanian Land Conservancy: protecting Tasmania's biodiversity through conservation on private land<br>by <i>Matthew Taylor and Denna Kingdom</i> ..... | 9  |
| Beyond parks and reserves – the importance of conservation on private land<br>by <i>Doug Robinson, Tiffany Inglis and Stephen Firms</i> .....               | 11 |
| Working together for woodlands by <i>Trish Fox</i> .....                                                                                                    | 13 |
| Promoting plant conservation on leasehold land in the Australian Capital Territory by <i>Geoff King</i> .....                                               | 15 |
| Wildlife Refuge on a small private landholding in NSW by <i>Adrian Fethers and Maya Beretta</i> .....                                                       | 17 |
| Whole of Paddock Rehabilitation – Landscape Restoration Grows Up<br>by <i>Jason Cummings, Lori Gould and Graham Fifield</i> .....                           | 19 |
| Cross Property Biodiversity Planning by <i>Toni McLeish</i> .....                                                                                           | 20 |
| Botanic gardens plant conservation partnerships: Mackay region by <i>Toby Golson</i> .....                                                                  | 22 |
| Recording Aboriginal traditional knowledge at Paruku IPA, Western Australia by <i>Tanya Vernes</i> .....                                                    | 23 |

## Regular Features

|                                                                                                                 |    |
|-----------------------------------------------------------------------------------------------------------------|----|
| ANPC in the USA: directions in science and conservation at the Smithsonian Institution.....                     | 25 |
| Report from New Zealand Plant Conservation Network.....                                                         | 27 |
| Research Roundup .....                                                                                          | 27 |
| Book Review.....                                                                                                | 29 |
| Information Resources and Useful Websites.....                                                                  | 30 |
| Conferences and Workshops.....                                                                                  | 31 |
| ANPC Corporate Members .....                                                                                    | 32 |
| ANPC kick off the first two workshops on – <i>Managing Native Vegetation in Travelling Stock Reserves</i> ..... | 33 |

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## From the editor

*Selga Harrington*

*Parsons Brinckerhoff*

The theme for this issue of Australasian Plant Conservation is 'Mechanisms for plant conservation on private land'. National Parks and other public reserves account for a small fraction of all land in Australia and many vulnerable plants, animals and critical habitats exist only on private land. For this reason conservation on private property is critical to the ongoing survival of Australia's biodiversity and without it much of Australia's biodiversity would be under significant threat and could be lost.

Both government and non-government organisations are working towards encouraging landholders to take steps to conserve some or all of the natural features of their properties. A range of private conservation mechanisms have been developed in the hope that more of Australia's biodiversity can be preserved.

In this issue of Australasian Plant Conservation, we explore the conservation mechanisms being used to help achieve plant conservation on private land, including land purchase and/or management by bodies such as the Trust for Nature, Bush Heritage, and other non-government organisations such as Tasmanian Land Conservancy and National Parks Association; the implementation of wildlife refuges, the use of Voluntary Conservation Agreements and Conservation Covenants as well as the operation of Conservation Management Networks.

The articles commence with an overview, written by Paul Foreman, of Bush Heritage and their work in buying properties for conservation management across the country. This is followed by two articles on threatened species conservation in south east Queensland and northern NSW, the first by Paul Donatiu on the conserving the rare flora of the Granite Belt in Southern Queensland and the second, by Maria Matthes outlining the work of Macadamia Conservation Trust and the Australian Macadamia Society in protecting threatened *Macadamia* species.

The work of the Tasmanian Land Conservancy, a non-profit conservation organization, is described by Matthew Taylor, including their approach to conservation on private land which includes acquisition of land to be kept and managed as private permanent reserves or protected by conservation covenants and then resold, as well as Partnerships set up with the State Government to promote and facilitate voluntary conservation agreements.

We then take a closer look at conservation mechanisms in Victoria through an article by Doug Robinson and colleagues on the conservation work of the Trust for Nature achieved through the delivery of voluntary, perpetual conservation covenants on private land; the purchase and management of land or donation of land to the Crown. This is followed by an article by Trish Fox on the Gippsland Plains Conservation Management Network, focusing on conservation of Grassy Box Woodland.

We then move to the ACT and southern NSW to explore the conservation mechanisms used there, with a particular focus on conservation of Grassy Box Woodland. This includes an overview of conservation on leasehold land in the ACT by Geoff King; a personal account of setting up a wildlife refuge by Adrian Fethers and Maya Beretta; Greening Australia's Whole of Paddock rehabilitation program by Jason Cummings and colleagues and an exploration of the work of the Catchment Management Network's cross property biodiversity planning by Toni McLeish.

These themed articles are followed by two additional articles. The first, written by Toby Golson, describes how conservation partnerships have been built between the Australian National Botanic Gardens in Canberra with botanic gardens in Queensland (Gladstone Tondoon Mackay Regional Botanic Gardens) as well as the Mackay Branch of the Society for Growing Australian Plants, to help conserve rare and endangered plants of the Far North Queensland and Mackay region through the creation of a dispersed national collection. The final article explores the successes of a collaborative project aimed to establish an ethnoecological database of plants, animals and health of the Paruku Indigenous Protected Area in the Kimberley region and the intricate nature of traditional knowledge.

The issue concludes with our regular features: Zoë Smith's report from the USA, Report from New Zealand Plant Conservation Network, Research Roundup; a book review, Information Resources and Useful Websites and Conferences.

It's a bumper issue for you to enjoy on the long cold winter evenings.



# Significant Plant conservation on Bush Heritage reserves – the meaning of new discovery

Paul Foreman

Bush Heritage, Queensland, [pforeman@bushheritage.org.au](mailto:pforeman@bushheritage.org.au)

The Bush Heritage business model, founded on a big idea simply encapsulated in the phrase: “we don’t beat around the bush, we buy it back (and keep it)”, is today - 20 years after our birth in Tasmania’s Liffey Valley – as strong as ever. The fact that we commit to keeping our reserves sets us apart from most other private conservation organisations and is central to our long-term, ecosystem-driven approach to plant (and indeed biodiversity) conservation. Because of the long-term nature of our business, we go to great pains to ensure we acquire the ‘right’ properties. While aesthetic and marketing appeal obviously help to ‘sell’ our investments to supporters and the public at large, the foundation of our decision-making is good science and sound ecological principles. Our land assessment strategy (BioPrEP - Mackey et al. 2010) highlights our system-based approach by focusing on ecosystem resilience and population viability, especially of unique and threatened species and ecological communities. With the long term objective to “protect, restore and rehabilitate land systems and associated ecological processes, along with their evolved characteristic species, assemblages and habitats”, our rationale is that it is better to secure and restore relatively healthy systems rather than those that are more degraded and damaged. This is not just a more cost effective strategy, but also likely to be more successful ecologically over the long-term. While it is early days for our long-term ecological report card, one feature is already apparent: the more we look, the more we find in terms of significant species and ecological communities. Nowhere is this more evident than with threatened plants. Below are a few recent examples of discovery stories and how we are starting the long-term process of recovery through indirect and direct management.

Edgbaston (Qld): – This 8,100 ha property, 140 km north-east of Longreach, was acquired in 2008 to protect the extraordinary biota of its Great Artesian Basin mound springs –especially its endemic and critically endangered fish (Red-fin Blue-eye; see [www.bushheritage.org.au](http://www.bushheritage.org.au), and Fairfax et al. 2007). But the story of the property’s endemic flora is just as fascinating, if much less well known. Only last year, a botanical survey turned up three more potentially undescribed plant taxa, bringing the list of new, potentially new, or recently described plant species to 15, and there is still scope for further discoveries (Table 1). Our approach to protecting most of these species (as well as the equally lengthy list of endemic fauna) is to gradually restore the property’s 50-or-so natural springs through

stock exclusion, feral pig control and weed control (e.g. Para Grass *Urochloa mutica*, formerly *Brachiaria mutica*) But as with the Red-fin Blue-eye, we are also considering more drastic intervention (such as translocations) for a couple of the Pipeworts (*Eriocaulon* spp.) because they are effectively only present on one tiny spring each (Davies et al. 2007).

Nardoo Hills (Vic): – Located 210 kms north-west of Melbourne in the wheat-sheep belt of south-east Australia, the 817 ha Nardoo Hills Reserve has also seen a number of significant new finds in recent years - most notably two Victorian endemic terrestrial orchids. Northern Golden Moths (*Diuris protena*) was first described in 2006 (Jones and Clements 2006), and Robust Greenhood (*Pterostylis valida*) was thought extinct for 70 years until rediscovered at this site last year. Although the Grassy Box Woodland (dominated by *Eucalyptus melliodora* and *E. microcarpa*) reserve has a history of pastoralism, it remains ecologically healthy because it has never been cultivated and is contiguous with an extensive area of largely protected, interconnected public bushland around the nearby township of Wedderburn. Under Bush Heritage’s stewardship, which involves excluding stock and controlling rabbits and key weeds such as Patersons Curse (*Echium plantagineum*), the orchids have been able to flourish. A further dimension of the Bush Heritage approach, is illustrated by our collaboration with the local team of orchid conservation staff at the Bendigo office of DSE (Department of Sustainability and Environment). Detailed population monitoring and further searching has documented numerous patches of orchids across the property that, subject to further study, should represent viable long term populations. The discovery of these species caused considerable excitement, but as at Edgbaston, there is still scope for further discoveries.

Boolcoommatta (SA): – A 63,000 ha former sheep station 100 kms west of Broken Hill and just inside the SA border, has also been the stage for a number of important botanical discoveries since the property was acquired and restructured into a conservation reserve in 2006. Slender Bell-fruit (*Codonocarpus pyramidalis*) was first recorded by our Reserve Managers in 2009 in the Mulga (*Acacia aneura*) shrublands of the reserve’s eastern rocky hills. Its natural range extends (as scattered patches) throughout the Flinders/Olary ranges, so there has been an expectation it would turn up at Boolcoommatta.

Further into the western half of the reserve, on the flat saltbush plains of the Broken Hill complex, thick patches of an unusual acacia on thin sand dunes stand out in a sea of low chenopod shrubs. This is *Acacia carneorum*, which is restricted to a narrow band along the NSW–SA border and is called Purplewood because of its striking purple heartwood. Although we have always known this species was present on the reserve, it has only been in recent years, in the absence of stock and with the establishment of rabbit and macropod exclosures, that we have started to gauge the impact of each on Purplewood's natural recruitment, especially through suckering. And it is only just in time. The vast majority of the remaining patches are dominated by very old senescing plants. Maintaining low total grazing pressure for extended periods, and in particular knocking out rabbits anywhere near these dunes, is the key to recovering this species.

Also on these vast open plains, Boolcoomatta supports one of SA's few populations of the nationally threatened Red Swainson-pea (*Swainsona murrayana*) – a species whose stronghold is far to the south-east in the grasslands of the Riverina. Surveys over recent years – following extraordinary rainfall – has demonstrated not only that this species is abundant and widespread on the property, but also that it is restricted to a landsystem/ecological community that was previously unrecognized in the region – a form of 'banded vegetation' comprising 'gilgai' depressions dominated by ephemeral forbs and grasses, alternating with almost barren run-off zones.

There is clearly a role for direct conservation management to halt the decline and extinction of some critically endangered species, but the Bush Heritage approach of targeting significant but ecologically healthy landscapes aims to see whole ecosystems of plants and animals protected and able to flourish - both the species we know about and those we don't (at least not yet)!

Bush Heritage is funded by public donations and it is only through the support of the Australian community that properties such as those described above can be purchased and protected in perpetuity.

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Table 1: 15 new (or potentially new) or recently described plant species found at Edgbaston Reserve, central Queensland.

| Status | Species                                             | Notes                                |
|--------|-----------------------------------------------------|--------------------------------------|
| Undes  | <i>Atriplex</i> spp. (Edgbaston)                    | Endemic to Edgbaston                 |
| Undes  | <i>Calocephalus</i> spp. (Edgbaston)                | Endemic to Edgbaston region          |
| Undes  | <i>Chloris</i> spp. (Edgbaston)                     | Endemic to Edgbaston                 |
| Undes  | <i>Dissocarpus</i> spp. (Edgbaston)                 | Endemic to Dongmabulla and Edgbaston |
| Ee*    | <i>Eriocaulon aloefolium</i> R.J.Davies             | Endemic to Edgbaston                 |
| Ee*    | <i>Eriocaulon giganticum</i> R.J.Davies             | Endemic to Edgbaston                 |
| Ee     | <i>Eryngium fontanum</i> A.E.Holland & E.J.Thomps.  | Endemic to Dongmabulla and Edgbaston |
| Undes  | <i>Gunniopsis</i> sp. (Edgbaston R.J.Fensham 5094)  | Endemic to Edgbaston                 |
| Undes  | <i>Isotoma</i> sp. (Myross R.J.Fensham 3883)        | Endemic to Edgbaston region          |
| E      | <i>Myriophyllum artesium</i> Halford&Fensham        | Endemic to GAB springs               |
| Undes  | <i>Peplidium</i> sp. (Edgbaston R.J.Fensham 3341)   | Endemic to Edgbaston                 |
| Undes  | <i>Sclerolaena</i> sp. 01 (Edgbaston)               | Endemic to Edgbaston                 |
| Undes  | <i>Sclerolaena</i> sp. 02 (Edgbaston)               | Endemic to Edgbaston                 |
| E      | <i>Sporobolus pamela</i> B.K.Simon                  | Endemic to GAB springs               |
| R      | <i>Sporobolus partimpatens</i> R.Mills ex B.K.Simon | Endemic to Dongmabulla and Edgbaston |

E – Endangered Nationally - Environment Protection and Biodiversity Conservation Act (Comm)

e – endangered in Qld - Nature Conservation Act

r – rare in Qld - Nature Conservation Act

\* = provisional conservation status only

Undec – new species yet to be formally described or named



# Conserving the rare flora of the Granite Belt in Southern Queensland

Paul Donatiu

National Parks Association of Queensland, Brisbane. Email: [pdonatiu@npaq.org.au](mailto:pdonatiu@npaq.org.au)

## Introduction

The Granite Belt is an extensive complex stretching from Stanthorpe in Queensland south to Armidale in New South Wales. It has many diverse and unusual habitats resulting from its elevation, topographic variation, outcropping rock and rainfall gradients. Vegetation communities vary from tall open forest in moist eastern parts and shrubby open forest and woodland on rocky slopes, to grassy open forests on alluvial plains and heath on granite pavements. Only 45% of the native vegetation in the Queensland part of the Granite Belt remains as remnants and 12% (17 000 ha) is located within conservation reserves. The latter areas are complemented by several state forests and a growing number of nature refuges.

## Botanical significance

The Queensland component of the Granite Belt has high plant species diversity and a high level of endemism. Over 50 species are listed as endangered, vulnerable or near threatened under State legislation. Another 70 species, mostly occurring in the montane heaths and shrubby woodlands of rocky areas, montane swamps, riparian habitats and sheltered valleys, are defined as being of special conservation interest. Some plants are at the northern limits of their range, while others in unusual habitats (such as shallow peaty depressions near the top of granite tors) are restricted to fewer than 10 populations. Many species are clustered together in areas of suitable habitat, some of which have formal protection in national parks and nature refuges, but other areas are completely unprotected. The National Parks Association of Queensland (NPAQ) has been working with local landholders to identify and protect rare flora in the Queensland Granite Belt area, particularly in the face of the predicted impacts of climate change.

## The threat of climate change

A suite of threatening processes affect plants in the Queensland Granite Belt, some of which appear to be exacerbated by subtle changes in climate. The area is getting warmer: the first frosts appear

earlier than two generations ago, the number of frosts is decreasing, and the peak spring wildflower period is now early, rather than late, September. Projected climate scenarios predict that by 2050 the Granite Belt will experience warmer temperatures (winter maxima +1.5–2.0°C; summer maxima +1.0–1.5°C), a 5–10% decrease in winter rainfall and a 0–10% increase in rainfall in the other seasons (DECC NSW 2008).

The predicted climatic changes could affect the conservation of the Granite Belt's rare flora through:

- more frequent and hotter fires that cause tree and shrub death, including of species regenerating only from seed (i.e. obligate seeders, including rare *Boronia* species) and destruction of soil seed banks
- changed hydrological regimes resulting in the drying of habitats, such as elevated swamps and wetlands, making them more susceptible to fire and potential habitat destruction
- the arrival of a suite of new species, e.g. drought-adapted exotics, that dislocate native species and alter species' interactions
- subtle shifts in vegetation types, for example towards more ironbark-dominated communities and more open woodlands.



*Increased frequency and hotter fires as a result of climate change may result in plant death and loss of soil seedbanks for obligate seeders that only regenerate from seed, such as the Granite Boronia (Boronia granitica). Photo: Paul Donatiu.*

## Rare Flora Survey Group

In late 2008, the National Parks Association of Queensland established a Rare Flora Survey Group to train and coordinate volunteers in identifying rare plant species and their habitats on public and private lands that make up the protected area estate in Queensland. To date, 19 people have been trained in plant identification and 40 people have participated in surveys of four nature refuges on the Granite Belt. These surveys have identified more than 40 new populations of rare and threatened plants. This is valuable information that landowners can use to direct the management of their properties for conservation. The ecological application of fire, fencing off specific areas from stock, removing weeds and managing natural regeneration are just some examples of these actions used in the area.

## Dealing with climate change

### The role of climate refugia

Climate refugia allow species to persist in the face of climatic stress (Morton et al. 1995) and are characterised by diverse topography, shelter from extreme events such as severe wildfires, and the persistence of moisture and temperature regimes suitable for species unable to survive in the surrounding environment. Evolutionary refuges, such as mountain tops, contain taxa with naturally fragmented and geographically restricted distributions.

Ecological refuges include sites that provide microhabitats that are moister and cooler than the surrounding environment, drought refuges such as permanent waterholes, and sites that offer some form of amelioration from prevailing environmental conditions and refuge from human impacts (Mackey et al. 2002). These areas support localised populations of species that are absent from or rare within the surrounding landscape, and which could become increasingly isolated and under pressure. Ecological refuges on the Granite Belt include elevated swamps, waterholes, mound springs, riparian areas, south-facing gorges and protected rainforest pockets (Donatiu 2009), while granite outcrops may also function as evolutionary refuges (Byrne 2007).

### The role of landscape scale corridors

In Australia many conservation groups and governments are currently promoting the establishment of landscape scale corridors as mechanisms to conserve biodiversity and maintain ecosystem function. Such projects are valuable when they promote collective conservation effort amongst land managers, connect otherwise unconnected remnant vegetation, increase habitat area or provide, where this is possible, altitudinal pathways for plant and animal migration.

Many such projects understate the role of landscape scale corridors in sustaining habitat variation and overstate the migratory benefits of such linkages. Currently there is little evidence to show that corridors will enable most Australian plant and animal species to adapt to the changes in climate that are occurring now and have been forecast for the future. Some research shows that species appear to be responding to climate change in less predictive ways and will not be served by the creation of migratory pathways (e.g. see Byrne 2007). Such research

challenges the science behind, and emphasis placed on, large scale corridor conservation projects in Australia.

There are other arguments against the widespread use of landscape scale corridors. For example, they can exacerbate edge effects, act as a conduit for the spread of invasive species, increase the spread of wildfire, and will not be able to protect species unable to move.

## Conclusion

The National Parks Association of Queensland has undertaken site and wildlife surveys of iconic Queensland landscapes since 1930, and advocated for their inclusion in the reserve estate. This task is no less important today, as the Queensland Government pushes for 20 million hectares in protected areas by 2020. But resources are finite, and acquisition decisions must be made responsibly using the best scientific understanding of the impacts and complex interactions wrought by a changing climate. The current Caring for Our Country Business Plan rightly prioritises the protection of refugia areas. At a local level, regional bodies such as the Queensland Murray-Darling Basin Committee are investigating how they can identify and protect these areas in places such as the Granite Belt by working with local landholders and conservation groups. The National Parks Association will continue to contribute as much as it can to this process.

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*Prickly Bottlebrush (Callistemon pungens), listed as a vulnerable species, is threatened by inappropriate or altered fire regimes. A 5–15 year fire regime is considered to be a suitable fire frequency to prompt resprouting in this species. Photo: Paul Donatiu.*



# Getting Wild about Macadamias: going it alone - passion, persistence and the good will of many

Maria Matthes

Healing History and Macadamia Conservation Trust, Lismore. Email: maria.matthes@macadamias.org

## Why go it alone?

The basis of the Macadamia Industry is the Macadamia species, in particular Bauple or Macadamia Nut (*Macadamia integrifolia*). All varieties used commercially were originally sourced from wild populations in Australia, although some of the bred varieties are crosses of wild plants. The Macadamia Industry is passionate about Macadamias – it is not just about the industry, it is also about the heritage of the nut.

It is estimated that over 80% of our wild Macadamias and the genetic diversity they contained has been lost since European settlement. Sadly, populations continue to be cleared for agriculture, development, and roads.

During the late 1980s through to the early 2000s, threatened species were an important issue on the political radar. Funding was available from State and Commonwealth governments for protecting threatened species, and for surveys, research, monitoring and on-ground works. However, the reality of the long-term commitments (time, financial, resources, monitoring, research) required to manage and conserve threatened species has fallen by the wayside as other issues become a political priority. Communities, landholders, farmers, industries and volunteers have to go it alone if biodiversity conservation is to improve for the future.

The Macadamia Industry, with its trustee the Australian Macadamia Society, officially launched the Macadamia Conservation Trust (MCT) on Threatened Species Day, 9th September 2007. The vision of the MCT is to conserve, manage and protect the wild Macadamia plants and populations that remain in the wild, and those planted from wild stock.

Four species of wild Macadamia are listed as threatened on the *Environment Protection and Biodiversity Act 1999* (EPBC Act):

- *Macadamia tetraphylla* (Rough-shelled Bush Nut) is vulnerable and occurs in northern NSW from the Richmond River to south east Queensland around Beenleigh.
- *Macadamia integrifolia* is vulnerable and occurs in south east Queensland, from the NSW-Qld border to north of Gympie.

- *Macadamia ternifolia* (Maroochy or Gympie Nut) is vulnerable and occurs in south east Queensland, from the Sunshine Coast to north of Gympie.
- *Macadamia jansonii* (Bulburin Nut Tree) is endangered and occurs in one location near Miriam Vale, Queensland.

Major threats to these species include weed invasion and land clearing for development and roads. As the focus of conservation shifts from individual species to the landscape scale, reduced resources are available for developing species recovery plans, which are necessary for addressing specific threats and appropriate conservation management actions for individual species. The MCT has thus supported the preparation and implementation of a recovery plan to identify and coordinate all the work required to ensure the conservation of genetic, species and landscape diversity of Macadamia species.

## Recovery Work Supported by the MCT

Since their inception, the Australian Macadamia Society and the MCT have supported many student and conservation projects that have provided exciting information to assist the recovery project of the threatened Macadamia species, including:

- Pollination and habitat fragmentation research (Neal 2007),
- Genetic research (Peace 2005; Hardner et al. 2008),
- Propagation of *Macadamia jansonii* for translocation,
- Predictive habitat modelling (Powell 2009), and
- Preparation of the Species Recovery Plan for the four southern *Macadamia* species (Costello et al. 2008).

## Getting Everyone Wild about Macadamias

The Wild about Macadamias project is taking the lead in coordinating the recovery program for the four southern *Macadamia* species. Like many projects of wide ranging species, the project requires the support of enormous numbers of people, groups, organisations, and government agencies.

The Macadamia Conservation Trust and the Australian Macadamia Society have partnered with Horticulture Australia Limited to improve Macadamia conservation, gaining supporters along the way. South East Queensland Catchments, Burnett Mary Regional Group, Northern

Rivers Catchment Management Authority and the University of Sunshine Coast have been invaluable, providing guidance and a range of support.

Local Councils and their residents, from the Richmond River in northern NSW to Miriam Vale in Queensland, are involved to varying degrees, providing financial support, integration with existing programs (e.g. Land for Wildlife), and/ or in-kind support. Some councils are still to come on board with the project. Councils currently actively supporting the project include Gympie Regional Council, Moreton Bay Regional Council, Scenic Rim Regional Council, Logan City Council, Gold Coast City and Tweed Shire Council.

Wild Macadamia plants occur on a variety of land tenures and ownership. Landholders already involved, or to be involved, include numerous local Landcare and similar groups, more than 100 private landholders (including farmers), Indigenous organisations, Department of Defence, a prison farm, mining companies, other companies, management authorities for state and local roads, state forests and national parks

The Wild about Macadamias project has also attracted interest from the latest Federal Government 'green' employment program, involving Conservation Volunteers Australia and Skill Centred Queensland employment service, which encourages young, enthusiastic and interested people to become the future's conservationists.

Special mention must be made to the Indigenous Traditional Owners, the traditional custodians of the Macadamia species. The Wild about Macadamias project includes consultation, engagement and participation with Indigenous people from the Gidarjil, Kobi Kobi, Butchella, Woka Woka, Mulinjarlie, Jagera, Yuggera, Ugarapu, Kombumerri, Minjungbal, Widjabul, and Nyangabul groups to conserve the cultural importance of the Macadamia species to Indigenous people.

### Why get Wild about Macadamias?

The Wild about Macadamias project provides awareness of Macadamia conservation, as well as general threatened species issues, such as why species are rare. Macadamias are generally threatened by the same major factors as other plant species and their habitats, thus the project raises additional awareness for plant conservation in general.

Getting Wild about Macadamias also contributes to the conservation, management and protection of other threatened species that co-exist with the wild Macadamias (too many to mention) and their habitat, which is mostly threatened lowland, floodplain and littoral rainforests.

Community involvement and support is crucial to the long-term conservation of Macadamia species, providing local knowledge, assisting with surveys to locate new populations, recording population and threat information, raising awareness, undertaking on-ground works, and in many other ways.



*Bauple or Macadamia Nut (Macadamia integrifolia): one of the threatened Macadamia species the Macadamia Conservation Trust and the Australian Macadamia Society are working to conserve. Photo: Ian McConachie.*

Information and training workshops have been, and will be, implementing the Species Recovery Plan; identifying the different species, where they are likely to be found, threats to the wild Macadamia species, the reasons for their rarity, the actions being undertaken in the Wild about Macadamias project, managing threatened species habitat, and what the community can do to be involved.

If you have information about wild Macadamia plants or populations, are interested in more information, contact Maria by email [maria.matthes@macadamias.org](mailto:maria.matthes@macadamias.org) or [maria@healinghistory.com.au](mailto:maria@healinghistory.com.au).

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# The Tasmanian Land Conservancy: protecting Tasmania's biodiversity through conservation on private land

Matthew Taylor and Denna Kingdom

Tasmanian Land Conservancy, Hobart, Tas. Email: [mtaylor@tasland.org.au](mailto:mtaylor@tasland.org.au)

## Introduction

The productive landscapes of northern, central and eastern Tasmania comprise few protected reserves. These fertile areas are largely privately owned and have been the focus of agricultural development in Tasmania since the early colonial period. Vegetation types most affected by human activities in Tasmania include grassland, woodland and dry eucalypt forest, which support many of Tasmania's threatened plant species. Of nearly 2000 vascular plants native to Tasmania (Baker and Duretto 2011) 472 are listed as threatened under State or Commonwealth legislation.

The Tasmanian Land Conservancy (TLC) was formed in 2001 with the primary aim of protecting biodiversity on private land in Tasmania. The TLC is a private, non-profit conservation organisation that works closely with the Tasmanian community, landowners, Government and business. This year the TLC celebrates its tenth year of delivering conservation programs that have achieved significant outcomes for plant conservation on private land in Tasmania.

The TLC employs three main mechanisms to protect conservation values on private land:

1. Acquisition of land to be kept and managed by the TLC as private, permanent reserves.
2. Operation of a 'Revolving Fund' where properties are purchased, protected by conservation covenants and resold, thereby returning capital to the fund to be spent on further conservation purchases.
3. Partnership with the State Government to promote and facilitate voluntary conservation agreements on private land.

The following case studies illustrate how some of these mechanisms are contributing to the conservation of threatened flora in Tasmania.

## The Vale of Belvoir Reserve

The Vale of Belvoir Reserve is a 473 hectare property that was purchased by the TLC in 2009. It supports diverse sub-alpine grasslands that are critical habitat for eight threatened plant species. This property has a long and stable management history. Regular mosaic burning of the *Poa* grasslands and low intensity, summer cattle grazing has occurred since 1897. The TLC is currently investigating the effect of fire and grazing on grassland diversity and threatened plant species at the Vale.

A primary goal of reserve management at the Vale of Belvoir is the protection of Alpine Candles (*Stackhousia pulvinaris*), a mat-forming perennial herb with distinctive flowers in early summer. The only known population of this species in Tasmania occurs at the Vale of Belvoir and the species is listed as vulnerable under State legislation. The species is locally abundant in disturbed grassland areas, such as bare ground around sinkhole margins and along animal pads (Threatened Species Section 2010a).

The TLC has completed extensive surveys that have identified additional populations and increased the known extent of Alpine Candles at the Vale. Further research is also being conducted into the ecology of the species. This information will be used to ensure ongoing sustainable management of Alpine Candles and other threatened species at the Vale of Belvoir.

## Rubicon Sanctuary

In 2003 the Rubicon Sanctuary became the first property to be purchased by the TLC's Revolving Fund initiative. A conservation covenant has been registered on the land title to protect the ecological values of the property. The property was resold in 2007. The nineteen hectare property supports over two hundred species of vascular plants and is an extremely significant site for orchid conservation in Tasmania. Over fifty species of orchid have been recorded on the property, of which five are listed as threatened.



The iconic Miena Cider Gum (*Eucalyptus gunnii* subsp. *divaricata*). Photo Matthew Taylor.

The Marsh Leek-orchid (*Prasophyllum limnetes*) is only known from this location. It grows in an ecotone between coastal *Eucalyptus amygdalina* woodland and low-lying marshy heath and sedgeland. The flowering of many Leek-orchids is strongly dependent on hot summer fires. Orchid flowering and reproduction usually increase in the year following a fire and decrease in subsequent years (Threatened Species Section 2010b).

Monitoring and adaptive management of orchids at Rubicon Sanctuary ensures the long term viability of threatened orchid populations. An ecological burn program has been established to create a temporal and spatial burn mosaic, thereby increasing structural and floristic diversity of the reserve. This promotes the persistence of the orchid taxa by maintaining openness in the heathy sedgelands and grasslands that are their primary habitat.

### Ironhouse Point Protected Area

The steep coastal terrain of Mt Elephant in north-east Tasmania is subject to short periods of extremely heavy rainfall that result in frequent and intense flash flooding of streams. This has excised deep gullies where damp and shaded conditions exist in an otherwise dry landscape and provide a haven for rare and unusual species of fern (Garrett 1992). In 2010 a conservation covenant was registered on private land at Ironhouse Point at the base of Mt Elephant to provide protection for two threatened fern species that have an extremely restricted distribution in Tasmania.

A population of Prickly Rasp Fern (*Doodia aspera*) was discovered during the covenant survey by a TLC conservation officer. This is a highly significant find as the species had not previously been recorded in Tasmania. The population is confined to a narrow band along Billy's Creek that is subject to frequent disturbance from flash flooding. The Ironhouse Point Protected Area also supports a population of the threatened Gristle Fern (*Blechnum cartilagineum*), which is only known from four geographically isolated locations in northern and eastern Tasmania.

### The New Leaf Project

The latest conservation initiative of the TLC is the New Leaf project, which aims to protect important natural values on 27 000 ha of recently purchased land throughout Tasmania. The core area of the New Leaf project is the central highlands of Tasmania, where several large properties contain potential habitat for the Miena Cider Gum. The Miena Cider Gum (*Eucalyptus gunnii* subsp. *divaricata*) is an iconic Tasmanian tree and is nationally listed as endangered. The species is endemic to Tasmania and is restricted to frost hollows and forest margins on the Central Plateau. The sap of the Miena Cider Gum is edible and provides an important food source for native fauna. It is thought to have been eaten by indigenous Tasmanian people and early European settlers, and the naturally fermented sap may have been consumed for an intoxicating effect (Potts et al. 2001). Substantial population decline of the Miena Cider Gum has occurred over the last twenty



Left: The endangered Marsh Leek Orchid (*Prasophyllum limnetes*). Photo Phil Collier. Right: Prickly Rasp Fern (*Doodia aspera*) – a new species for Tasmania. Photo Matthew Taylor.



Volunteers assist with monitoring of threatened flora at the Vale of Belvoir Reserve. Photo: Vicki Campbell.

years because of drought, grazing and inappropriate fire regimes. The TLC will undertake extensive surveys of New Leaf properties to identify new populations within the core range of the species. Where populations are found the TLC will work with local experts to develop management strategies to protect this iconic Tasmanian species.

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# Beyond parks and reserves – the importance of conservation on private land

Doug Robinson, Tiffany Inglis and Stephen Firms

Trust for Nature, Level 5/379 Collins St, Melbourne 3000. Email: [dougr@tfn.org.au](mailto:dougr@tfn.org.au)

## Conservation on private land

Victoria is Australia's most highly cleared state and continues to lose habitat through direct clearing or degradation at the rate of several thousand hectares each year. As a result of this extensive and rapid loss of native vegetation, many species of native plants and wildlife are threatened and some have become extinct, for example, Maiden's Bush-pea (*Pultenaea maidenii*) and Grey Fireweed (*Senecio georgianus*).

Historically, responsibility for the conservation of native plants and wildlife has resided with public land managers, for example, Parks Victoria and the Department of Sustainability and Environment, who manage parks and conservation reserves for biodiversity. However, in Victoria, where two-thirds of the land is privately owned – particularly the more fertile and more highly cleared parts of the landscape – it is recognised more and more that private land conservation is pivotal to the long-term future of many species of native plants and wildlife.

Trust for Nature works to conserve native plants and wildlife on private land in Victoria. We were established under the *Victorian Conservation Trust Act 1972* to work with landholders – farmers, retirees, families, etc – to protect land permanently and provide ongoing support to these landholders. Trust for Nature has developed a number of innovative ways to conserve biodiversity on private land and continues to evolve to meet the challenges and embrace the opportunities that arise in this exciting sector.

## Protection of native habitat

One of the Trust's key objectives under the Act is to protect areas that are "ecologically significant, of natural interest or beauty, of historic interest or of importance in relation to the conservation of wildlife or native plants".

Trust for Nature has achieved this objective primarily through the delivery of voluntary, perpetual conservation covenants on private land; the purchase and management of land; or donation of land to the Crown. The significance of each of these conservation actions is that they represent permanent habitat protection, which is recognised as contributing to the International Union for Conservation of Nature's (IUCN) protected area network and to Australia's National Reserve System (NRS).

Since 1972, Trust for Nature, in partnership with more than 1,000 landholders, has protected 42 906 ha of habitat

across the state. Of particular significance has been the Trust's ongoing focus on the permanent protection of two of the most highly threatened ecosystems in the world – temperate grasslands and temperate woodlands. More than 4500 ha of native grassland and 9100 ha of woodland have been protected under conservation covenants across Victoria's farming landscape over the past 30 years. The Trust has also tried to focus on the protection of unique ecosystems such as the Strathbogie Range's perched bogs – tiny patches of wetland habitat created by groundwater seepages from the granite bedrock. Nearly all of the bogs occur on private land and Trust for Nature has targeted their protection in the Goulburn Broken catchment over the past 10 years. To date, we have successfully negotiated permanent protection of bogs with ten landholders in this region.

In the same period, Trust for Nature has purchased and retained 52 properties, including its flagship 30 000 ha Neds Corner Station property on the Murray River west of Mildura. Altogether, these properties represent an additional 37 000 ha of private land habitat permanently protected for conservation. As part of this program, Trust for Nature has targeted the purchase and protection of threatened ecosystems, particularly grasslands, woodlands and wetlands. For example, the Trust recently purchased a 1895 ha property on the Avoca Plains that contains nationally significant grasslands and Buloke (*Allocasuarina luehmannii*) woodlands. The property is home to nationally threatened plant species such as Chariot Wheels (*Maireana cheelii*) (Nationally vulnerable (V), vulnerable in Victoria (v) and Slender Darling-pea (*Swainsona murrayana*) (V, State endangered (e)).

One of the Trust's unique roles within Victoria's conservation arena has been its active support for the protection of land through public appeals or donations of land. Its role has been especially notable in two major conservation campaigns:

## Anglesea Heathlands

The campaign to save the coastal heathlands between Anglesea and Airey's Inlet took more than five years of intense campaigning by the local community and the Great Ocean Road Committee in the early 1990s. At the time, nearly all of the heathlands were proposed for residential subdivision, including a 410 ha subdivision on one of three properties targeted for protection. The final planning

solution consisted of a negotiated outcome across the three priority properties, ultimately resulting in:

- permanent protection of 228 ha of private native vegetation under covenant
- purchase of 216 ha of habitat on one property by Trust for Nature, with funding support from the Australian Government and State Government
- purchase of 14 ha of habitat on another property, using funds raised by the Great Ocean Road Committee
- donation of 14 ha of land to Trust for Nature by the owners of one of the properties
- planning restrictions on the approved sub-division, ensuring that native vegetation on the sub-divided lots was retained.

Subsequently, the late Mary White, a passionate advocate for conservation of her beloved Anglesea Heathlands donated her house to the Trust so that proceeds from its sale could further assist with conservation in the area.

### Green's Bush

In 1985, the Green family applied to their local council to subdivide their 400 ha property into rural lots. A campaign began to save the bushland and add it to the adjacent Nepean State Park, including the establishment of an appeal by Trust for Nature to help raise funds to purchase the land. By 1988, the appeal had raised some \$1.3 million and, with additional funds from the State Government, Trust for Nature purchased 170 ha of Green's Bush. A planning solution negotiated for the remaining 230 ha of

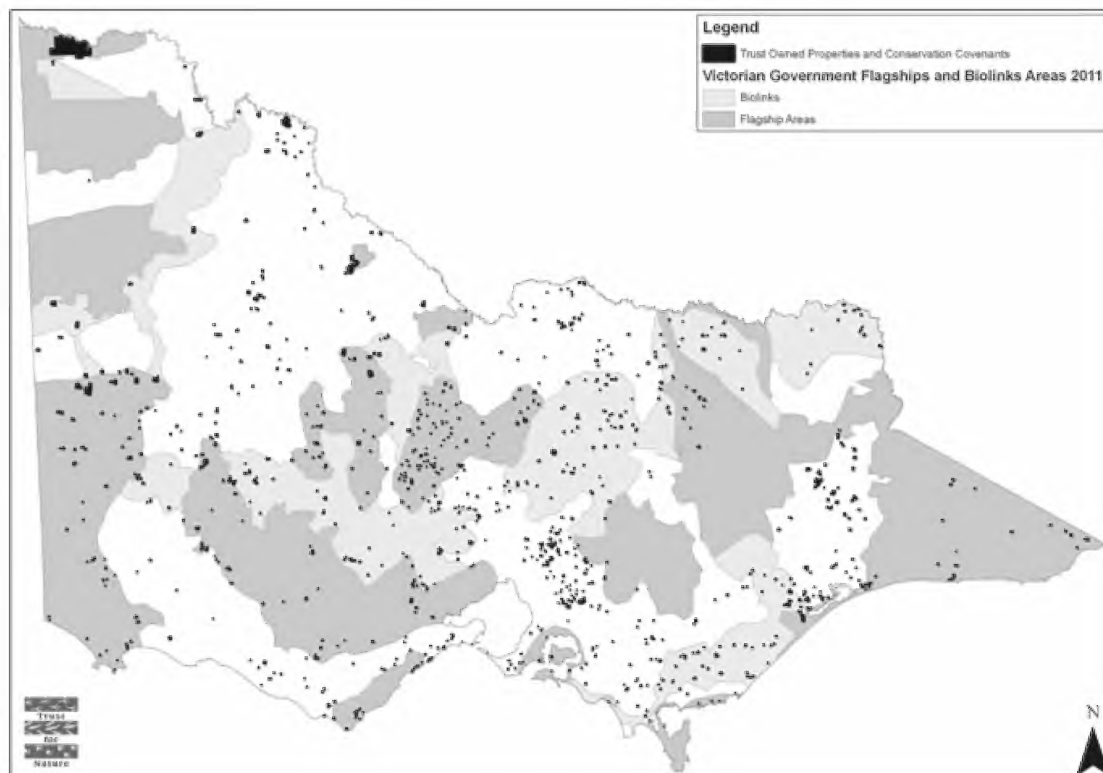
land allowed subdivision into 18 allotments, subject to stringent conditions and covenants with the Trust. In 1989, however, the State Government agreed to purchase the residual 230 ha of land, and incorporated it into what is now the Mornington Peninsula National Park.

### Threatened species protection

In addition to the protection of native habitat, Trust for Nature has also focused on the protection of threatened species and sub-species, using conservation covenants or land purchase as the principal way to secure threatened plants.

Currently, 368 threatened plant species have been recorded on Trust for Nature covenants and properties, including 41 nationally threatened species. Of the approximately 1300 private properties across Victoria with conservation covenants and Trust for Nature owned properties, nearly 40% are known to support threatened plants.

Species or sub-species of particular significance in terms of known populations on Trust for Nature land include Chariot Wheels (Nationally endangered (E),e), Concave Pomaderris (*Pomaderris subplicata*) (Vv), Euroa Guinea-flower (*Hibbertia humifusa erigens*) (Vv), Leafy Greenhood (*Pterostylis cucullata*) (Vv), Little Pink Spider-orchid (*Caladenia rosella*) (Ee), Matted Flax-lily (*Dianella amoena*) (Ee), Spiny Rice-flower (*Pimelea spinibractea spinibractea*) (Ce), Dwarf Kerrawang (*Rulingia prostrate*) (Ee) and Swamp Sheoak (*Casuarina obesa*) (e).



*Distribution of covenants in relation to bioregions*



### Active management

To support private landholders, Trust for Nature has an on-going Stewardship Program. The Stewardship Program entails the development and implementation of management plans for all of its covenants and properties. On grassland and woodland sites, in particular, this management may include active habitat disturbance through grazing or ecological burns to reduce biomass and maintain species diversity.

On the Harbury property near Gembrook, for example, the Trust for Nature local committee of management has actively removed an infestation of the woody weed Sweet Pittosporum (*Pittosporum undulatum*), which has resulted in an increase in the population size of two rare plant species: Bristly Shield-fern (*Lastreopsis hispida*) and Long Pink-bells (*Tetratheca stenocarpa*).

Other examples of active plant management across the State have included:

- reintroductions of significant species or additional life-forms, in accordance with relevant legislation and environmental guidelines

- establishment of fencing enclosures to improve understorey condition or protect populations of threatened species, including Whipstick Westringia (*Westringia crassifolia*) (Ee)
- guarding of notable plants from browsing by deer and native herbivores
- direct-seeding of sites with seeds from local provenance to add understorey and groundcover diversity.

### The future of conservation on private land

Trust for Nature is one of several private land conservation trusts in Australia. Our role in Victoria's conservation arena continues to grow. One of our goals over the next five years is to develop new and innovative ways with our partners to conserve Victoria's biodiversity, while providing on-going support to our volunteer landholders. Our achievements in the conservation of threatened species to date are a great base from which we can to continue to spread the word on the importance of conservation on private land.

## Working together for woodlands

Trish Fox

Gippsland Plains Conservation Management Network, Bairnsdale, Vic. Email: [facilitator@gippslandplainsecmn.org.au](mailto:facilitator@gippslandplainsecmn.org.au)

How do you reverse the fate of woodlands that are in imminent risk of extinction? Governments can buy them for the reserve system, Trust for Nature and private landholders can protect them via conservation covenants on title and farmers can reduce grazing pressure. But when those woodlands are found scattered across the landscape, all efforts are reduced.

Based in Bairnsdale, 350km east of Melbourne, the Gippsland Plains Conservation Management Network (GPCMN) has been working since 2002 to bring together land managers of woodlands and grasslands on public and private land. Many agencies and individuals on the GPCMN committee are not in the business of ecological restoration, but own or have responsibility for some important remnants of Gippsland Red Gum (*Eucalyptus tereticornis* subsp. *mediana*) Grassy Woodland and Associated Native Grassland, listed as a threatened ecological community under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Since 2005 the Australian Government has provided the GPCMN with funding to help farmers fence off iconic paddock trees. Working in a highly fragmented landscape

(over 95% of these woodlands have been cleared), with a relatively small budget, it is vital that funds are used wisely by working with partners and focusing on large areas of big trees near existing remnants.



Meerlieu Country Fire Authority volunteers helping Craig Bush burn his woodland patch to reduce exotic grass cover.  
Photo: Trish Fox

### Bigger is better

Patches of Red Gums under 10 ha are more prone to the insect-mediated dieback that has been a major stress in recent years. The GPCMN targeted larger areas close to existing vegetation. Edge effects are reduced and there is a potential seedbank nearby to allow natural regeneration to occur.

This approach complements the work of GPCMN's founding partner, Trust for Nature. It began targeting native vegetation along the Perry River over 15 years ago on private land near the 2000 ha Providence Ponds Flora and Fauna Reserve, managed by Parks Victoria. Trust for Nature has now almost doubled the area protected for conservation by purchasing land for reserves and negotiating conservation covenants on several private properties.

Sheep farmers Craig and Andrea Bush and sister-in-law Jenny Bush have two properties in the Perry River area with large areas of Red Gums adjacent to other remnants. These properties have large numbers of mature trees. Their protection is vital because gum trees, particularly those with smooth bark such as Gippsland Red Gums, are the major hollow producers in the landscape. It can take up to 100 years for a small hollow to form. The Victorian Department of Sustainability and Environment has shown that over 73 mammal, bird and reptile species rely on these hollows, while another 69 use them but are not dependent on them.



*Peregrine falcon chicks at a paddock tree site fenced off by the Gippsland Plains Conservation Management Network. Photo: Andrea Bush*

With funding assistance from the GPCMN, the Bushs have fenced off a 26 ha patch beside Providence Ponds, one of the biggest public land remnants in the region. It is an area they have always admired and where they have undertaken pest and weed control. The financial assistance for fencing and managing the site made the difference for them when it came to long-term protection and covenanting. Realistically, they may never have fenced the stock out of these areas without the assistance.

They fenced off another 17 ha of woodland beside an 1800 ha property owned by the Australian Landscape Trust (ALT). The following year, ALT placed a Trust for Nature conservation covenant over 800 ha of their woodlands and grasslands, permanently protecting several nationally endangered vegetation communities and species.

The covenant sits on title in perpetuity and is transferred if the property is sold. Permanent protection is a core pillar of the GPCMN. Ecologist Suzanne Prober created the CMN model with fellow ecologist Kevin Thiele and economist Mike Binning. They considered permanent protection very important because there is a constant attrition of high quality sites through change in management or ownership. Even if the current landholder is very amenable to conservation goals, there is no long-term security of ownership.

### Hollows for falcons

Peregrine falcons normally nest on cliff faces, but south of Victoria's Great Dividing Range they also use tree hollows. However, on the Gippsland Plains active nests have dropped from 12 to 2 in the last 20 years. The big dead trees the birds use are vulnerable; one lightning strike can kill them. In response, the GPCMN called on its partners for help to put up artificial nests as insurance for the birds. SP Ausnet provided poles and machinery and funding came from the Australian Geographic Society, Bairnsdale Power Station and Hancock Victorian Plantations. The local police officers and publicans also



*Mature Red Gums near existing remnants are targeted by the Gippsland Plains Conservation Management Network for protection. Photo: Trish Fox*



came to the aid of the birds, donating the proceeds of their annual charity golf day.

Many other GPCMN partners are now involved in the restoration of the sites. East Gippsland Landcare Network has helped with fencing smaller patches across the Bushes' farms, creating stepping stones across the landscape. Greening Australia is direct seeding areas to improve shrub and forb diversity and a carbon off-set company, Citola, is trialling full restoration of the Grassy Woodland and Associated Native Grassland vegetation community.

Last year, Trust for Nature invited ecologist Tein McDonald to host an ecosystem resilience workshop and, with GPCMN, mapped the Bush properties to focus resources to the effect. GPCMN have also enlisted the local Bird Observers' club to do monitoring at other sites so that changes in bird abundance and diversity over time can be followed. The landholders too have become involved in the ecological management of their sites, spraying pasture grasses and then organising the local Country Fire Authority volunteers to burn trial patches into which native grass seed has been introduced.

Targeting larger areas of paddock trees beside existing remnants is working well. This year several sites fenced off in 2005 have been revisited and, in general, the larger patches over native understorey were doing much better than smaller patches over pasture grasses; natural regeneration is occurring, native grass cover has increased and tree canopies are healthier.

This year the GPCMN received Victorian State Government funding for the first time and are now working with another landholder to fence off almost 20 ha of woodlands beside a public reserve, Backwater Morass, which is a Ramsar wetland connected to the Gippsland Lakes. This area is part of a biolink, a large intact area of native vegetation in a fragmented landscape (in this case Toms Creek and the Perry River). The GPCMN is working with the Victorian Department of Sustainability and Environment, Trust for Nature and Landcare across public and private land to make the best use of resources and help drag our wonderful woodlands back from the brink of extinction.

## Promoting plant conservation on leasehold land in the Australian Capital Territory

*Geoff King*

*ACT Parks and Conservation, Canberra. Email: [Geoff.King@act.gov.au](mailto:Geoff.King@act.gov.au)*

### **Introduction**

Land tenure in the ACT is exclusively leasehold. In 1996, the Government commenced a review of rural land policy and launched a new one in March 2000. The new rural policy provided the basis for securing sustainable rural enterprises and a high degree of protection for the natural values that they support and with which they interact. This resulted in the availability of 99 year leases in pre-determined areas and, as a prerequisite for new rural leases, the development of Land Management Agreements for sustainable use of the land. A February 2000 amendment to the *Land (Planning and Environment) Act 1991* made a Land Management Agreement mandatory for the granting of a new rural lease.

A range of incentives were developed to encourage lessees to participate in the scheme and to recognise the important role they play in managing and protecting community nature conservation assets that occur on their land. These initiatives include the following.

### **Long-term rural leases to promote sustainable agricultural enterprises**

Sustainable farming in the ACT requires that lessees be able to pursue different types and scales of enterprise, and achieve a level of profitability that meets ongoing maintenance costs and allows for capital purchases. Security of tenure is an important consideration when making investment decisions.

### **Provision of incentives to facilitate environmental conservation on leased rural land**

In addition to the introduction of sustainable farming practices, there is a need to conserve significant biodiversity values that occur on leased rural land. This is a responsibility shared by the community as a whole. To this end and prior to the issue of a new lease, the Government secures any features and areas having special conservation value, primarily through a Land Management Agreement and, where necessary, a withdrawal clause.

The landholder's continuing contribution to conservation of environmental assets has been recognised by valuing the land for rental buy-out purposes in terms of stock carrying capacity rather than market value and applying a discount to that valuation. In return for the foregone market revenue from these leasing incentives the Government has secured entitlements and rights, including measures for care of the natural environment.

### **Establishing a partnership between farmers and Government**

In providing fair and equitable incentives for farmers to take up long term leases and move towards a sustainable form of production, the Government has required farmers to prepare management plans and regularly review the management of their enterprises. This has been done through Land Management Agreements. In nature conservation terms, Land Management Agreements will identify features and areas having special conservation value and set out management measures required to achieve agreed conservation outcomes. Where new conservation values are identified, there is provision for amendments to the Agreements to be initiated before the regular review period is reached.

Where native vegetation has been identified on a property, the following points would in most cases be included in the Land Management Agreement.

- Carrying out weed control in a manner that does not to adversely affect native trees, shrubs, grasses or wildflowers and eucalypt regeneration.
- In timbered areas where there is a dominance of native ground cover, managing fertiliser application so there is no net increase in soil nutrients. A reduced application rate or frequency may be specified so that nutrient removal by grazing is balanced by nutrient input, but is not exceeded.
- Helping to maintain the range of understorey and groundcover native species by not introducing new pasture species.
- Outlining a vegetation management strategy aimed at such things as encouraging natural regeneration, improving animal habitat and vegetation cover, and managing pest plants and animals.
- Strategic planting/sowing of local provenance native species to link, augment or rehabilitate patches of vegetation. The species mix of grasses, shrubs or trees and the establishment techniques to be used may need to be specified to demonstrate an accord with existing vegetation structure and floristics and animal habitat.

### **Financial assistance for conservation works**

The ACT Government initially established the Rural Conservation Fund as a financial assistance scheme for conservation of biodiversity on leased rural land



*Endangered Yellow Box-Red Gum Grassy Woodland on any rural lease in the ACT is recognised in a Land Management Agreement between the landholder and the ACT Government. The Agreement must outline conservation measures the landholder will undertake for the ecological community.*

*Photo: R. Purdie.*

(i.e. off-reserve conservation). It was designed to fund projects that were important to help conserve the ACT's biodiversity and that involved a direct financial cost that would be an unreasonable burden for the landholder to meet in its entirety. Where the project involved a continuing commitment by a lessee to a particular management strategy for the land, relevant details of the commitment could be included in the Land Management Agreement for the land in question. The intention was to protect the investment made in terms of longer-term conservation outcomes.

Whilst the Rural Conservation Fund no longer exists, there are a number of programs under the control of both the ACT Government and the Commonwealth Government that provide grants to conserve the natural environment on rural land. The ACT Governments actively supports ACT rural landholders to obtain these grants.

### **Conclusion**

There are 185 rural leases in the ACT. To May 2011, about 190 Land Management Agreements between the ACT Government and rural landholders have been signed; these include revised agreements as well as agreements where a lease has changed hands. Any landholder with a lease that has an identified threatened ecological community present (i.e. one listed as threatened under the ACT Nature Conservation Act 1980) is required to recognise this and outline management measures in their Land Management Agreement. These agreements and the other measures outlined above are providing an important framework for plant and ecosystem conservation in the ACT.

# Wildlife Refuge on a small private landholding in NSW

*Adrian Fethers and Maya Beretta*

*Email: av@fethers.com.au, maya.beretta@environment.nsw.gov.au*

## Small rural holdings around Canberra

Creating a Wildlife Refuge on private land in NSW to protect and conserve native plants and animals is voluntary. A Wildlife Refuge can be created to encourage the rehabilitation of a locally indigenous species, restore natural environments, study wildlife and ecosystems and create simulated natural environments. It involves an agreement between the landholder and NSW Minister for Environment. The refuge status is attached to the land title but can be removed by subsequent landholders through negotiation.

There are a range of other private land conservation options available in NSW from both Government organisations such as the Office of Environment and Heritage (Wildlife Refuges, Conservation Agreements) and non-government organisations including the Nature Conservation Trust, Community Environment Network (Land for Wildlife), and the Humane Society International.

Throughout NSW, there are 662 Wildlife Refuges covering almost 2 million hectares. In the NSW South Eastern Highlands Bioregion, there are 149 Wildlife Refuges covering 94 000 ha. Only six are less than 20 ha and 19 are under 50 ha. Most are more than 100 ha. There is an opportunity for many more small Rural Residential holdings to apply for Wildlife Refuge status.

Palerang Shire is one of about 25 local government areas in South Eastern NSW and is bounded by Lake George in the north, Tallaganda State Forest in the south, Queanbeyan City to the west and the Morton and Budawang National Parks to the east.

Within the Shire there are approximately 2300 holdings zoned Rural Residential. The average size is 6 ha and the smallest is 2 ha. These small holdings grew from a demand around the Canberra region during the 1950s and 1960s for rural lifestyle developments. The zonings may have been inspired through local government in various shires not only in NSW of course, but defined, selected and administered through local government and gazetted by State Government.

Twelve objectives for Rural Residential land in Palerang were defined in the 2002 Local Environmental Plan for the then Yarrowlumla Shire (now Palerang Shire)<sup>1</sup>. It is



*Grassy box woodland on the Fethers Wildlife Refuge.  
Photo: Maya Beretta*

encouraging to note that four of these objectives at least acknowledge conservation or environmental issues. We argue that Councils should more actively promote the conservation of biodiversity in these holdings. From observation, most rural residential holdings are hobby farms in which naturally occurring vegetation is cleared and the land is either grazed with animals like alpacas or deer, or planted with crops such as grapes, or trees (olives and other fruit). On most, native animals are actively discouraged, e.g. by kangaroo-proof fences. A park like appearance is sought, characteristic of a rustic European countryside, reminiscent of the occupiers' homelands.

Agriculture or grazing is clearly uneconomic even on fertile holdings. Soils in Palerang are mostly poor, and unsuited to farming of any type. Coupled with the unreliable rainfall (most of the Shire receives 550- 700 ml per annum) there is a compelling argument in favour of an approach that puts conservation and promotion of biodiversity more front and centre of the regulations governing land use on rural residential blocks. Many reviews of primary industries have concluded that farms of this size in Australia very rarely make any income at all for owners. As shown, most derive most if not all income from off-farm activities.

<sup>1</sup> Yarrowlumla Local Environment Plan 2002 – NSW Government Gazette number 96, 2002; page 11



### A personal experience – The Fethers Wildlife Refuge

The subject of this article is a 17 ha parcel established during the 1960s. The area was settled around 1900 and used for grazing. A substantial block of around 2000 ha was acquired by the Defence Department around 1910 and remains in use as a training ground. We adjoin this property in the saddle separating the Molonglo and Yass River valleys.

Our family moved into the house in 1999. We had three teenage children, a dog and a cat, and at that stage little knowledge of, or interest in, conservation. We were attracted by an opportunity to restore a rundown garden and finding space for kids and ourselves out of town. We inherited a well-situated and constructed house with much infrastructure including a large lake with island and jetty which I foolishly considered big enough to drought proof the place.

The first year or two was a steep learning experience described by others in many books. We set about the garden and discovered many treasures and began to appreciate the local flora and fauna. We repaired the smashed henhouse and enclosed it, then found it necessary to cover it to prevent foxes taking the chooks. We had a similar experience with a vegetable garden, covering it to exclude possums. We planted raspberries, digging up native grass to do so, then found it too dry and dug them up again. Weeds took over but have gradually been suppressed, by hand rather than with chemicals, including Serrated Tussock, Patterson's Curse, Mustard Weed, Sorrel, Scotch Thistles and Fleabane. Of course the most difficult challenge has been the eight or nine years of drought. We kept rainfall records and each year toiled as either autumn or winter rains failed and our once magnificent lake shrank to a pond, although it never actually dried up. This led us to devise more cunning ways to get moisture onto plants and to become more conscious of the properties of different plants we were attempting to cultivate.

We decided to apply for some form of security for the land to protect the birds and animals we found. We found out about the various options from a voluntary group (Friends of Grasslands) whom we invited to inspect the block. They got quite excited by the diversity and quality of plant life on what we thought was pretty ordinary land. I was interested to observe people I regarded as sane, down on knees with hand held microscopes, and the exclamations of others calling to colleagues to 'Come and have a look at this'. We were assisted by our local NPWS officer who had a



*Cassinia uncata: one of the many treasures discovered.  
Photo: Maya Beretta*

look at the land and thought it might qualify as suitable for some type of conservation status, but it became apparent that they would not just accept any and all applicants and the process was quite lengthy.

Throughout we were motivated to act through our observation of other blockies. Probably the most distressing manifestation of local ignorance was the number of kangaroos killed on roads around this part of the country. Rarely were they removed and when we came across one, we sometimes found live or dead joeys either in the pouch or nearby. Also distressing was and is still the attitude of leaders in the government to create employment without adequate protection of biodiversity. It appears the days of Canberra as the Bush Capital are over. What we have tried to do is protect some local wildlife including the threatened Gang Gang Cockatoo and Powerful Owl, Double-barred Finches, and Pardalotes, and protect a small area of a poorly conserved plant community, in this case grassy box woodland. We hope others will be motivated to follow. There is much to conserve.

For further information, see the Conservation Partners Webpage: <http://www.environment.nsw.gov.au/cpp/ConservationPartners.htm>

#### Further reading

Rural Residential Rural and Environmental Areas Discussion Paper, Sections 5 – 8; Palerang Council, May 2008.

# Whole of Paddock Rehabilitation – Landscape Restoration Grows Up

*Jason Cummings, Lori Gould and Graham Fifield.*

*Greening Australia Capital Region Email: JCummings@act.greeningaustralia.org.au*

## Summary

Whole of Paddock Rehabilitation (WOPR) represents a significant increase in the scale of revegetation and restoration of grassy woodland ecosystems. This novel approach, built on 20 years of development and refinement, integrates biodiversity restoration with agricultural production at the whole-paddock scale. Developed by Greening Australia and landholders in the sheep-wheat belt of south east NSW, WOPR is gaining support and national recognition as a cost-effective solution to a landscape scale problem (Manning and Lindenmayer 2009).

## The WOPR Approach

‘Traditional’ ecological restoration in the overcleared agricultural landscapes of Box Gum Grassy Woodlands has involved either:

- establishment of wind-break style vegetation corridors through direct seeding or planting tubestock
- fencing of remnant native vegetation to manage grazing pressure
- fencing riparian areas sometimes accompanied by revegetation (Bennett et al. 2000).

In each of these approaches, conservation is largely considered in competition with production, and significant resources are invested in building new fences. In WOPR, we use the existing fencing infrastructure, and use the money saved to fund stewardship payments that enable the land holder to rest a paddock for five years. These payments reflect approximately half the productive loss over that rest period, reflecting a shared approach between the producer and the program investor in developing public and private good outcomes.

During this period widely spaced belts of diverse native trees and shrubs are established, with species composition targeted at local Box Gum Grassy Woodland communities. After five years, stock can be reintroduced on a rotational grazing basis. Since we are mostly using existing fencing, we are able to target larger paddocks, averaging 20 ha.

## Outcomes

The reestablishment of trees and shrubs at this scale breaks the ‘paddock tree decline’ spiral (Fischer et al. 2009), although there will of course be time lags where some habitat resources of old paddock trees continue to reduce until these trees mature (for example, hollows suitable for occupation by some wildlife can take 100 years to develop; Ball et al. 1999).

Although the program has not been long-established, there are already a variety of anecdotal and quantified production and conservation benefits of having a paddock “WOPRed”.

Livestock production improvements include:

- enhanced weight gain and health from increased shade and shelter
- reduced mortality of lambs and recently shorn animals
- provision of additional feed source for livestock during summer with emerging awareness of parasite control benefits (the pods and foliage of Acacia species used in this region have been found to be palatable to Merino sheep; Fifield 2006)
- the return of pasture to heavily eroded or saline areas making them productive again.

Environmental benefits include:

- regeneration of remnant vegetation, paddock trees and native grasses
- increased native habitat and biodiversity, especially for birds (Taws 2007, Munro et al 2007)
- establishment of “islands” or refugia between remnant vegetation
- reduced spread of wind-borne weed seeds, and the capture of dust
- reduced run-off and salt and sediment entering watercourses.

## Cost Effectiveness

There are several key drivers that influence the cost of WOPR, including:

- the value of the land being targeted and the value of the production loss during the rest period (these are inter-related – cropping land, for example, would likely require a higher stewardship payment to offset half of the productive loss than grazing land)
- the willingness and ability of landholders to undertake the program (e.g. social or cultural reasons may influence the willingness of landholders to undertake the program at different stewardship payment levels)
- the effectiveness of direct seeding native trees and shrubs, including site preparation and pre-existing site condition (currently high-nutrient, ‘improved’ sites are avoided, since weed competition for native trees and shrubs presents risks, and there is plenty of marginal native pasture land to target).



A 12-year old WOPR paddock at Binalong, near Yass in NSW, where the idea was developed. Photo: Graham Fifield

WOPR benefits from the efficiency of scale (~20-25 ha per site) and the use of mechanical direct seeding refined over the last three decades. As a result WOPR is approximately three times more cost effective in on-ground costs than traditional revegetation programs, (\$600 / ha versus \$1900 / ha respectively) in the upper Lachlan and Murrumbidgee catchments (these are 'on-ground' costs excluding delivery and administrative overheads; site assessment, developing landholder agreements, monitoring and evaluation, program overheads).

#### Current Program Status

The Australian Government's Caring for our Country program has supported WOPR programs, including pilot sites, in NSW (Lachlan, Murrumbidgee and Hawkesbury Nepean Catchments), the ACT and Western Australia (Avon Catchment), which together will rehabilitate over 1100 ha of degraded land in agricultural systems.

Testament to its inclusive approach, trial programs in southern NSW have resulted in over 30 farmers waiting to get involved.

On the back of this program Greening Australia will be looking to expand WOPR throughout the sheep-wheat belt, starting with trials and demonstration sites in similar regions. For further technical information on the program, to develop local trials, or to stay in touch with updates email: [wopr@greeningaustralia.org.au](mailto:wopr@greeningaustralia.org.au)

#### Acknowledgements

WOPR was developed over the last decade by Leon & Bubbles Garry ("Weilora", Binalong), John Weatherstone ("Lyndfield Park", Gunning) and Sue Streatfield (formerly Greening Australia), with recent significant support from the Lachlan CMA and Caring for Our Country. WOPR is a trademark of Greening Australia Capital Region.

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## Cross Property Biodiversity Planning

Toni McLeish

Conservation Management Network, Queanbeyan. Email: [toni.mcleish@environment.nsw.gov.au](mailto:toni.mcleish@environment.nsw.gov.au)

The Grassy Box Woodland Conservation Management Network (GBWCMN) was established in 1998 to support managers of Box Gum grassy woodlands across the western slopes and tablelands of NSW. These woodlands are listed as Endangered Ecological Community under the NSW *Threatened Species Conservation Act 1995* and are a component of the Critically Endangered White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and

Derived Native Grassland is listed under the *Environment Protection and Biodiversity Conservation Act 1999*.

With limited resources the GBWCMN has focused its efforts on broad communication and extension. The opportunity provided by the Caring for Our Country program 2009 formalised existing relationships and lead to greater on-ground outcomes and increased support for network members in the project area.



With funding from Caring for our Country, the Department of Primary Industry and the Office of Environment and Heritage NSW, with the support of other project partners including the GBWCMN, have developed and implemented a landscape planning exercise that has neighbours working together to create landscape linkages for biodiversity across property boundaries. Six groups of 10 properties are currently engaged in the process, linking thousands of hectares.

The Cross Property Biodiversity Conservation Planning, which is a part of the landscape project, has the key goal to improve habitat and connectivity between habitat patches. Providing a range of habitat types is also important, as different plants and animals have different needs and may have different tolerances to disturbance. Some species thrive in open grazed paddocks, while others cannot survive, or move readily, through these areas. The overall success of a plant or animal in the landscape will depend on:

- what comprises habitat for that species
- how much of that habitat remains in the landscape
- how far the species is able to move or disperse through non-habitat
- how the remaining habitat is distributed across the landscape.

Typical farms have small patches of remnant woodland, or indeed different elements of habitat provided in nearby areas. Finding a way to mesh these different areas together so the component patches can function like one larger patch is critical to connect organisms (both plants and animals) across the landscape, thereby allowing:

- breeding between different populations, retaining genetic diversity and health
- dispersal of young
- seasonal movements to meet needs for food and shelter
- enabling recolonisation into a patch affected by adverse events such as a fire. If this is prevented, that patch will become simplified, with fewer species.

Creating a mesh of habitats across the landscape, including highly fertile areas near creeks (which provide food, water

and shelter in dry times when they are scarce in the hills) will best allow organisms to cope with reduced amounts of habitat.

### Look for simple solutions

A range of basic approaches have been combined on properties to incorporate biodiversity conservation enhancement measures into property plans with minimal impacts on the farming enterprise. For example:

- areas that are impractical to graze (too rocky, isolated by a creek) or rarely grazed (laneways, mostly cropped) may be good places to consider for habitat improvement by planting scattered trees and shrubs and spreading native grass seed
- improving existing habitat patches, – (ideally minimum 10 ha) and expand and improve shape by infill planting to nearby trees and patches
- adding other habitat elements (fallen logs, different grasses, wattles etc)
- grazing stock in a way that does not impact negatively on biodiversity. For example keeping ground cover at least 10 cm tall and allowing native plant species to set seed
- concentrating on linking remnants that are no more than 1 km apart and link patches using the most basic connection
- concentrating on protecting and restoring scattered paddock trees over whole of paddocks
- planting so that trees are scattered less than 70m apart
- adding groves of trees, fallen timber and shrubs to corridors or paddocks
- protecting rocky areas for reptiles and plants.

A minimum 100 m wide corridor with these qualities qualifies as a patch if it is at least 10 ha in size. Intermediate patches should be created if the distance between patches is greater than 1 km.

Building corridors from good habitat out to small, isolated remnants should be avoided. Fauna may try to breed in the isolated remnants and find there are insufficient resources to successfully rear young, or there is no nearby habitat for their young to disperse. When creating links to such remnants, try to build multiple links or continuous habitat (scattered trees) to reduce this risk.

Structural complexity at both a paddock and farm scale should be increased and some fertile areas, not necessarily locked up from farm use, but carefully managed to protect wildlife. Utilise patchiness in grazing systems – whatever the normal grazing regime, (set-stocked, rotational, high density short duration), consider changing it in some areas, or for some periods. Some animals and plants like more bare areas, while others like dense tall tussocks.

### Acknowledgements

This article is based on an article written by Susan Jackson NPWS for “Woodland Wanderings” the GBWCMN newsletter Spring 2010).



*Regeneration within a Grassy Box Woodland remnant.  
Photo: Graham Fifield*

# Botanic gardens plant conservation partnerships: Mackay region

Toby Golson

*Senior Horticulturalist, Australian National Botanic Gardens, Canberra. Email: Toby.Golson@environment.gov.au*

The Australian National Botanic Gardens' (ANBG), located in Canberra, has a mission 'to grow, study and promote Australian plants'. In 2010, ANBG established a partnership with Gladstone Tondoon Botanic Gardens to help conserve rare and endangered plants of the Port Curtis region and Far North Queensland as part of a dispersed 'national collection' (Golson 2011). Using that relationship as a template, ANBG has developed a second partnership with two organisations—the Mackay Regional Botanic Gardens and the Mackay Branch of the Society for Growing Australian Plants—to help conserve plants of the Mackay region.

## The local partners

The Mackay Regional Botanic Gardens is primarily concerned "with the research, interpretation and display of the flora of the surrounding region" (Landplan 2010). Its primary focus is on the native plants of the Central Queensland Coast Bioregion that incorporates Mackay and environs. This bioregion is centered on the high-rainfall coastal lowlands but extends west to Eungella and the Clarke-Connors Range, north to Gloucester Island (north of Proserpine and Airlie Beach) and south to Clairview (Sattler and Williams 1999). Two disjunct, southern outlier sections of the bioregion include coastal areas north of Yeppoon, centered on Byfield and Shoalwater Bay.

The Society for Growing Australian Plants (SGAP) was formed in 1957 for the purpose of studying and developing the horticultural potential of Australian native plants and preserving them through cultivation. With over 8000 members throughout Australia, it is one of the largest horticultural societies in the country. The Society has made a significant contribution to the knowledge of the Australian flora, its cultivation and introduction into nurseries and home gardens. The Mackay Branch of the Society for Growing Australian Plants Queensland Region (Mackay SGAP) was formed in 1978, and has actively pursued the aims of the Society by promoting the potential of the local flora ever since. The branch also played a significant and influential role in the establishment of the Mackay Regional Botanic Gardens and has a continuing close relationship with it.

## Identifying a problem

In 2009, during the Botanic Gardens of Australia and New Zealand Congress, the Curator of the Mackay Regional Botanic Gardens, Dale Arvidsson outlined to me the



*Plants propagated from collections in the Eungella highlands will become part of the dispersed national collection within the Mackay Regional Botanic Gardens and the Australian National Botanic Gardens. Photo: Simon Hay.*

difficulty of growing high altitude rainforest taxa on the coastal plain where the Mackay Gardens is located. This was in the context of the increasing threat high altitude plants are under from a changing climate where there is nowhere to retreat higher (i.e. altitudinally) as is the case in the Australian Alps in New South Wales and Victoria.

At the conclusion of the congress, I attended a field trip to Eungella National Park hosted by the Mackay SGAP. Its members reinforced Dale's thoughts and discussed the possibility that ANBG might be able to play a role in helping to conserve these and other rare and endangered plants from the region. Indeed, Irene Champion, Honorary Secretary of the Mackay SGAP, had personally donated material of a number of Mackay region rare and endangered taxa to ANBG in the early 1990s, some of which are doing well in the ANBG's living collection today.

## Partner contributions

ANBG is currently upgrading its conservation focus, through both the national seed banking initiative and by pursuing with locally based on-ground practitioners a dispersed 'national collection' of threatened species and other significant plants.

The Mackay Regional Botanic Gardens holds significant collections of plants listed as threatened under the Commonwealth *Environment Protection and Biodiversity*



*Acronychia eungellensis* (top) and *Atractocarpus chartaceus* (bottom), two species from the Eungella highlands.  
Photos: Steve Pearson.

*Conservation Act 1999* (EPBC Act) and the *Queensland Nature Conservation Act 1992*. It also has flora from EPBC listed endangered Brigalow and Semi-evergreen Vine Thicket ecological communities and the critically endangered Littoral Rainforest ecological community, as well as from the potentially climate change threatened refugium of Eungella. Many of these species were initially collected by Mackay SGAP members who provided much

of the initial momentum for the subsequent establishment of the botanic gardens.

The above collections in the Mackay Regional Botanic Gardens constitute an important resource for the dispersed 'national collection'. Letters have been exchanged between the three partners to share plant genetic material. In reality this means Mackay Regional Botanic Gardens—Mackay SGAP will provide ANBG with wild collected (or wild origin), vouchered material from the rich flora of the Central Queensland Coast Bioregion. ANBG will use this material for propagation and/or seed storage and for onward distribution to other interested botanic gardens or plant conservation bodies, and ideally back to the Mackay region for recovery planning and revegetation activities.

### Two-way benefits

As outlined in the Tondoon partnership (Golson 2011), such relationships can further conservation objectives through spreading risk by making propagation material available to other like-minded organisations. To ensure that benefits also flow from the national institution to the smaller ones, ANBG plans to offer professional development opportunities to staff or members of the partner organisations.

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## Recording Aboriginal traditional knowledge at Paruku IPA, Western Australia

Tanya Vernes

WWF-Australia, Broome, Western Australia. Email: [tvernes@wwf.org.au](mailto:tvernes@wwf.org.au)

### Introduction

In 2001 the Walmajarri custodians declared Paruku, also known as Lake Gregory, as an Indigenous Protected Area (IPA). An IPA is an area managed by Indigenous people for both conservation of biodiversity and protection of cultural values.

As often found in the Australian landscape, Paruku contains extraordinary beauty in a harsh, arid landscape.

A central feature of the IPA is the massive wetland system comprising a series of connected lakes, temporary and permanent soaks, claypans and creeks, supporting internationally significant numbers of waterbird species. Paruku Lake, often regarded as the most impressive and astonishing feature in this arid desert setting, is on average 14 km wide, expanding to more than 387 km<sup>2</sup> when the country is flooded. The wetlands and the diversity of life they support are outstanding biodiversity features.



Very limited flora and fauna surveys have been undertaken by scientists within the IPA to date, and most have concentrated on the fringing vegetation given its importance for waterbird breeding (Burbidge & McKenzie 1983; Marchant & Halse 1990).

### Recording traditional knowledge

One of the earliest priorities of the IPA was to record the traditional knowledge held by elders of that country. As with many Indigenous communities across Australia, the loss of traditional knowledge, as elders pass on before being able to transfer that knowledge to the younger generations, is an issue of great concern and one felt with urgency.

Beginning in 2004, a collaborative project between Paruku IPA, WWF-Australia, the Northern Territory Department of Natural Resources, Environment, The Arts and Sport, the Kimberley Language Resource Centre and the Kimberley Land Council aimed to establish an ethnoecological database of plants, animals and health of the IPA. We undertook four intensive field surveys over two years in teams comprising elders, IPA rangers and younger people, a fluent Walmajarri linguist (Eirlys Richards), an ethnobiologist with over 20 years experience (Glenn Wightman) and myself.

Surveys were undertaken on-country, visiting different areas (and ecosystems) within the IPA, often camping for a week at a time, exploring the area, and identifying and collecting plant specimens and animals encountered. We methodically worked through a series of prompting resources, such as specially prepared lists and pictures of species, to record knowledge. A linguist was central to this project as knowledge is anchored in language and language continually reinforces the knowledge specific to country.

These first surveys established the baseline information for the study and format for the database, which we were able to add to over the years through subsequent on-country trips and biodiversity surveys, and correct or amend entries as elders or others remembered different aspects of knowledge pertaining to particular species. Biodiversity surveys undertaken by rangers through a collaborative project between Paruku IPA, the Kimberley Land Council and WWF-Australia in 2007, 2008 and 2010 have continued to add to this database.

Memory work is often hard going for the elders, especially where there are only one or two people available or remaining. Sometimes elders are reaching far back into their childhood to recall names or uses of plants. At other times where the plants are still in regular medicinal use, such as with Ngirrirli (*Aristida contorta*) or a favourite food such as Kumpupaja (*Solanum diversifolium*) or feature in continuing law ceremonies, the names and meanings, songs and stories flow easily.

We have catalogued over 300 plants to date through this project. While no new species have been discovered, we have extended the known range of many plants and

recorded numerous traditional uses ranging from food resources to ceremonial to medicinal.

### The nature of traditional knowledge

The inherent linkages between species and language, song, place and kinship were evident as we worked our way through the country and discovered the diverse ecosystems and the plants and animals they contain. This is the lesser known side of Aboriginal traditional knowledge in mainstream Australia: that plants and animals, or even whole ecosystems are imbued with meaning that cannot be separated out.

Taking a plant or animal out of context most often proved a fruitless exercise, which is why the vast majority of work was undertaken on-country. This exemplifies the disconnect between western science and traditional knowledge. Western science frequently removes objects from their context to examine them, dissecting each part of the whole and replicating experiments in isolation from their locale. Indigenous knowledge does the opposite: each object is part of a whole that it cannot be removed from, yet it can be viewed from many different perspectives, depending on the context.



Gracie Mosquito and Fatima Lulu holding Ngirrirli (*Aristida contorta*). Photo: T. Vernes.



Eirlys Richards (left), Bessie Doonday (left) and Anna Johns (back) completing corrections to the Paruku Plants and Animals Dictionary at Mulan. Photo: S. Brown.

Our surveys therefore revealed more than lists of species, clearly exposing the embedded nature of country within Aboriginal culture and knowledge, providing a 'place' for traditional knowledge to be enacted and passed on.

Over the past decade Indigenous knowledge of country has become well regarded, yet the extraordinary depth of this knowledge is not easily interpreted in a western scientific framework. When an Aboriginal person points to a plant, names it and describes its use it is tempting to believe that is where the knowledge ends. In reality this is just the surface of an extremely complex knowledge system. It may encompass many layers of meaning and elements (e.g. kinship, animals, landscape features) which are routinely separated out in western culture, or relay information over a time span of many thousands of years.

Similar to science, traditional knowledge is empirically driven as it is based on thousands of years of observation (Hunn 1988, p. 13). Yet this complexity is difficult to display meaningfully in the surveys we recorded at Paruku. This was evident when an elder chanted a ceremonial song linked to a particular plant we had named, or when we noted that a sacred site of the Kulyu trees (*Atalaya hemiglauca*) is also the southern-most occurrence of this species. Translating this imbued knowledge within a western context remains a challenge.

### Achievements

This project, alongside recent biodiversity surveys with the IPA rangers, has enabled a baseline of biodiversity information to be established invaluable to measure future changes and determine planning priorities. Probably even more important has been the recording of the elders' knowledge so that information is there as a resource for future generations. A selection of the information is to be

published in the Paruku Plants and Animals Dictionary in the coming months. Community members and educators have already begun to draw on these two resources to develop language and environmental education materials in Walmajarri schools.

### Conclusion

Recognising that there may be more than one knowledge system and set of cultural values about a resource is critical to managing that resource cooperatively. Environmental management must accommodate these sometimes diverse cultural values, and also acknowledge the different role that biodiversity and environmental processes play in maintaining both cultural and ecological life.

### Acknowledgements

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## ANPC in the USA: directions in science and conservation at the Smithsonian Institution

Zoë Smith

Smithsonian Environmental Research Center, Maryland, USA. Email: smithz@si.edu

### Summer and the war on Stink Bugs

As if on cue, summer arrived in full swing the day after our storm windows were removed. Vines were already trying to creep through the windows as the screens were nailed into place to keep the hungry mosquitoes out. The garden soil heated so quickly after our last frost that my broccoli has bolted and gone straight to flower. One small squash has begun to develop but I am thinking of taking wagers

on how long it will withstand being probed and sucked by the invasive Brown Marmorated Stink Bug (*Halyomorpha halys*). The thumbnail-sized insect was introduced from Asia to northeastern North America in the late 1990s, and in recent years has become so populous that they are threatening orchard crop yields and driving homeowners to despair as they crawl through cracks and crevices looking for warm places to spend the winter. While they are not directly harmful to humans, when irritated the insects

produce a strong 'fragrance' that resembles sweaty feet. Creative removal remedies, which have become common cafe conversation, include freezing, drowning in soapy water, vacuuming (the dust-buster is my favourite) and even burning with propane torches. Unfortunately, these methods are insect-irritating, resulting in bug-removal along with an aromatic legacy of old socks.

### Staying employed in science

Unemployment in North America is currently at around 9%; in science it's possibly much higher. Finding and securing a job in science can take months of preparation and years of searching. Postdoctoral fellows at the Smithsonian Environmental Research Center often discuss the trials and tribulations of finding employment in the USA. For about half of North America's postdoctoral fellows, the next step would be settling into a tenure-track academic position. However, in the current job market there can be more than 400 applicants for a single lecturing position, even at small, rural universities. In addition to the standard CV and cover letter, applications also require teaching and research statements, copies of publications, several formal reference letters and even teaching videos.



*Pink Lady's Slipper Orchid (Cypripedium acaule) at Wintergreen, Virginia. Photo: Zoë Smith*

For successful applicants, the selection procedure includes a phone interview followed by a campus interview that involves up to three days of seminar presentations and meetings with faculty. Those who decide to extend their postdoctoral positions may decide to apply for funding from the National Science Foundation, with an estimated 6% success rate for a relatively poorly-paying position. Perhaps one way to survive in science is to collect wagers on stink bug destruction.

### The importance of life below ground

One of the wonderful perks of a job in science is global travel for conferences and field sampling. In early May, 2011, I travelled to Prague, Czech Republic, for the first International Conference on the Ecology of Soil Microorganisms. Recent advances in molecular technology have rapidly advanced our understanding of the diversity and importance of microbes as important drivers of soil processes. Bacteria and fungi generally comprise the majority of soil biomass (Six et al. 2006) and are the major drivers of soil organic matter turnover. Further, fungi form intimate associations with the roots of most land plants in which they provide essential nutrients, water and protection from pathogens. Some plants are highly dependent on associations with specific soil fungi; for example, orchids such as the Pink Lady's Slipper (*Cypripedium acaule*) rely on fungi for all of their nutritional requirements in their early life stages (known as mycoheterotrophy). Recent research has shown that fungi involved in mycorrhizal interactions with plant roots can drive the majority of soil carbon sequestration (Wilson et al. 2009), thereby regulating the global carbon cycle. However, anthropogenic disturbances such as increasing nitrogen deposition can reduce fungal mycelial growth (e.g. Nilsson et al. 2007). Understanding the diversity and function of soil microbes is essential for maintaining soil processes such as carbon sequestration and nutrient cycling.

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# Report from New Zealand Plant Conservation Network

Kerry Gillbanks

Email: [kerry.gillbanks@aucklandcouncil.govt.nz](mailto:kerry.gillbanks@aucklandcouncil.govt.nz)

## Member of Global Partnership for Plant Conservation

In March the NZPCN became a member of the Global Partnership for Plant Conservation. This partnership is made up of a wide range of groups working in different areas for plant conservation. The partnership shows a commitment by participating organisations to the Global Strategy for Plant Conservation.

### Link between large seeded trees and bird loss

A link has been proven between the importance of fruit eating birds (frugivores) and fleshy fruit producing plants for their dispersal and regeneration. Researchers Debra Wotton (Landcare Research) and Dave Kelly (University of Canterbury) have researched the effects that reduced bird populations have on the germination of two of our large fruited native trees, *Beilschmiedia tarairi* and *Corynocarpus laevigatus*. At the research sites dispersal of both species is dependent on a single frugivore and many fruits remain uneaten. Bird dispersal gave better seedling

growth and survival and also protected seeds and seedlings from predatory introduced mammals. This shows that protecting birds is important for the conservation of forest plants.

### Website Updates

Test your knowledge with our new on-line quiz. Whether you want the test to be hard, moderate or easy, you can test yourself on New Zealand natives, exotics or both and either Latin or common names. Have a go

The Network has reached more than 22,000 images on its website. Since the website was developed in 2003 more than 250 photographers have contributed towards this.

Visit [www.nzpcn.org.nz](http://www.nzpcn.org.nz) for more information

### Reference

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## Research Roundup

Compiled by Kirsten Cowley, Centre for Plant Biodiversity Research, Canberra. Email: [Kirsten.Cowley@csiro.au](mailto:Kirsten.Cowley@csiro.au)

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Contributions to Research Roundup are welcome, and should be sent to Kirsten Cowley at the above email address using an email subject heading "APC Research Roundup" or similar. Their inclusion will be subject to available space.

## Book Review

### **Coastal Plants A Guide to the Identification and Restoration of Plants of the Perth Region**

*Kingsley Dixon, Kings Park and Botanic Garden, WA  
CSIRO Publishing, February 2011, 288 pages with  
colour photographs  
Paperback ISBN: 9780643100473, AU \$39.95*

Coastal Plants is an attractive guide to 87 of the most common and useful native plants on the Southwest coast of Western Australia and 16 of the most annoying and destructive weeds of this environment.

Cambridge Coastcare, based in the Western Suburbs of Perth, are a particularly successful (some might jokingly argue, somewhat over-qualified) community restoration group who are sharing the secrets of their success through the production of this book. Listed among their members are a number of highly respected scientists, including the author, Dr Kingsley Dixon. Dr Dixon is also the Director of Science at Kings Park and Botanic Garden and a member of the research team that isolated 'karrikinolide', the compound in smoke that vastly enhances seed germination in not only Australian native plants but also in a number of horticultural, crop and weed species.

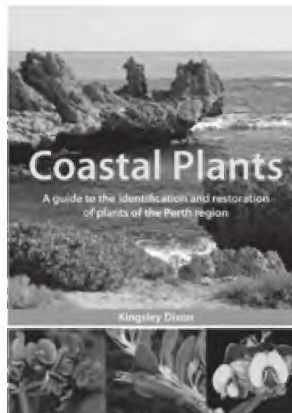
Though designed to service the needs of the coastcare community, providing detailed advice and tips on coastal restoration, in fact there's something for everyone in Coastal Plants – serious restoration groups, home gardeners, students, birdwatchers and beach ramblers.

The main geographic focus is Perth and the surrounding Swan Coastal Plain, but many of the profiled species also have a broader distribution in Southwest WA. Groups and individuals with an interest in plants anywhere from Geraldton to Esperance may find this guide valuable.

The format is clear and there are ample photos and illustrations, making it a pleasing book just to flick through.

The introductory chapters provide an overview of the ecology, endemism, evolution and human history of the Western Australian coastline. Information on the geomorphology of the Swan Coastal Plain and the Quindalup Dune systems gives a fascinating insight into the forces that shaped this area, and the influences this has on its plant life. Reference to local icons such as the Quarry Amphitheatre at Bold Park encourage a new geological perspective on familiar sites.

The author stresses the importance of good coastal planning and management to avoid re-creating the mistakes of the past. In the highly mobile coastal environment, inappropriate development has often led to serious erosion and damage not only to the dunes and natural



vegetation but also roads and buildings. These errors of urban planning have often then been compounded by the introduction of weedy non-native plants for dune stabilisation.

There is a detailed section on restoration techniques for coastal dune environments, offering thorough advice on the planning, implementation, monitoring and evaluation of a coastal revegetation project.

For example, the book provides clear, illustrated instructions for testing the

dormancy and viability of seed, including both simple techniques that can be undertaken without expert assistance and those that require access to laboratory facilities and will probably require the services of a seed supplier or research institute. Advice is given on seed collection and storage (and a reminder, should it be needed, that there are strict controls on seed collection in WA, requiring a permit from the Department of Environment and Conservation and the permission of the landholder).

Handy features like the 'Watchpoints' draw the eye to critical points of coastal restoration such as the different seed treatments that may be required to encourage germination.

The bulk of the volume is of course, the species guide. Each plant is illustrated with a distribution map and colour photos showing plant habit, leaves, flowers and often fruits or seeds. As well as a general description and information on flowering period and distribution, every plant has notes on pollination (hence the interest for birdwatchers), advice on propagation, use in restoration and, where relevant, recommendations on how to grow them at home.

A lovely addition is the appendix on habitat plants for moths and butterflies, such as the locally endemic and endangered graceful sun-moth (*Synemon gratiosa*).

Over 850 hectares of native vegetation are still being cleared each year within the Perth Metropolitan Region<sup>1</sup> alone and much of the biodiversity of the near-coastal environments is being rapidly consumed by urban sprawl. In the face of such ongoing destruction, volunteer coastcare groups deserve increased support for their countless hours spent restoring the coastline where damage has already been inflicted.

Coastal Plants will no doubt become a valuable asset to many such groups in Southwest WA. It's also a very readable, user-friendly publication suitable for restoration experts, plant enthusiasts and laymen alike.

*Review by Katherine Howard, WWF.*

<sup>1</sup> WA Local Government Authority 2010, unpublished data based on WA Department of Agriculture aerial photography



## Information Resources and Useful Websites

### **Biodiversity conservation incentive programs around Australia**

*Department of Sustainability, Environment, Water,  
Population and Communities*  
[http://www.environment.gov.au/biodiversity/incentives/  
incentive-programs.html](http://www.environment.gov.au/biodiversity/incentives/incentive-programs.html)

There are many conservation incentives offered by all levels of government, and the not-for-profit sector. The information provided in this website includes contact information and links to various programs across Australia.

### **National Reserve System, private landholders getting involved**

*Department of Sustainability, Environment, Water,  
Population and Communities*  
[http://www.environment.gov.au/parks/nrs/getting-involved/  
private.html](http://www.environment.gov.au/parks/nrs/getting-involved/private.html)

This website provides an overview of how private landholders can help to build the National Reserve System through Conservation Covenants. This includes case studies and information on how to apply for funding. Links to state and territory covenanting program websites are also provided.

### **Guides to private conservation in NSW and QLD**

*Environmental Defenders Office*  
*NSW:* [http://www.edo.org.au/edonsw/site/pdf/pubs/  
100503private\\_conservation.pdf](http://www.edo.org.au/edonsw/site/pdf/pubs/100503private_conservation.pdf)  
*QLD:* [http://www.edo.org.au/edonq/images/stories/factsheets/  
2\\_private\\_conservation\\_-\\_nature\\_refuges\\_and\\_coordinated\\_  
conservation\\_areas.pdf](http://www.edo.org.au/edonq/images/stories/factsheets/2_private_conservation_-_nature_refuges_and_coordinated_conservation_areas.pdf)

These publications summarise the different private conservation options available in NSW and Queensland with the aim of helping you decide which option would be most suitable for your property and circumstances.

Download a copy from websites provided above. Hard copies of the NSW publication are also available free, contact the Environmental Defenders Office: <http://www.edo.org.au/edonsw/site/contactus.php>

### **Protected areas on private lands discussion paper**

*Department of Environment and Natural Resources, SA*  
[http://www.environment.sa.gov.au/Conservation/Land/  
Protected\\_areas\\_on\\_private\\_land\\_discussion\\_paper](http://www.environment.sa.gov.au/Conservation/Land/Protected_areas_on_private_land_discussion_paper)

The Department of Environment and Natural Resources SA is developing a framework that will provide a range of mechanisms for establishing and managing protected areas on private land. The main objective is to make it easier

for private landholders and conservation organisations to achieve their own conservation goals and at the same time make an effective contribution to the formal, long-term protection of the State's biodiversity.

A discussion paper has been developed that outlines the options for consideration. Comments and feedback are invited.

### **Habitat 141 vision moves another step closer to reality**

*Victoria Naturally Alliance*  
<http://www.victorianaturally.org.au>

The largest habitat restoration project ever tackled in Victoria took another step forward recently with the creation of Habitat 141 Inc. which will become the main public face of the project. Read more at <http://www.victorianaturally.org.au/page.php?nameIdentifier=habitat141inc.settoroll>

### **Australian Seed Bank Partnership**

<http://www.seedpartnership.org.au/>

The Australian Seed Bank Partnership brings together expertise from leading Australian botanic gardens, state environmental organisations, academic institutions and non-government organisations with the aim to safeguard Australia's plant populations and communities against further extinction, ensuring that our plants are kept safe for future generations. The partnership's initiatives focus on collecting and storing seed to conserve biodiversity and building and sharing knowledge to support restoration and conservation activities across Australia.

### **Burning Issues Sustainability and Management of Australia's Southern Forests**

*Mark Adams, Peter Attiwill*  
*CSIRO Publishing, June 2011, 160 pages, colour photographs*  
*Paperback ISBN: 9780643094437, AU \$49.95*

Following the tragic Victorian Black Saturday fires in 2009, a much greater urgency now confronts policy makers, land and fire managers and communities living in bushfire areas. This has led to a call for a single, simple answer on fuel reduction burning to reduce the bushfire risk. Burning Issues explains that this is a complex issue without such a simple answer. The book gives an account of the role of fire in Australia's ecosystems, how we have to accept and live with fire, and how we can manage fire both for safety and for diversity.

Available from <http://www.publish.csiro.au/pid/6421.htm>

## Information Resources and Useful Websites (cont.)

### **Forest Bountiful Settlers' Use of Australian Plants**

*Penny Watsford*

*Nullum Publications, 2010*

*Paperback, ISBN: 9780975682333, AU \$20*

Forest Bountiful, Settlers Use of Australian Plants explores how early settlers used some of the local shrubs, vines, ferns, wildflowers, grass, orchids and herbs. The region of interest is the Tweed Valley and surrounding areas in northern New South Wales and southeast Queensland from the 1840s until the 1950s.

Information was obtained from interviews with long-term Tweed residents as well as published and unpublished documents. The book is illustrated with photographs as well as line drawings by Margaret Elliott.

Available from <http://www.nullumpublications.com.au/nullum-shop.html>

### **Flora of Australia Volume 39 Alismatales to Arales**

*Australian Biological Resources Study/CSIRO Publishing,*

*June 2011, 160 pages, colour illustrations*

*Hardback, ISBN: 9780643104235 - AU \$130.00*

*Paperback ISBN: 9780643104242 - AU \$110.00*

Volume 39 of the Flora of Australia describes 17 families of monocots in 76 genera and 256 species. Most of the families are aquatic, and include the sea-grasses, pond

weeds, and some major agricultural weed species. Four families are entirely or mostly terrestrial.

Available from <http://www.publish.csiro.au/nid/18/pid/6816.htm>

### **Is that plant poisonous? An Australian field guide for livestock, pets and people**

*R.C.H. Shepherd*

*Published by R.G. and F.J. Richardson, June 2010,*

*264 page, full colour*

*ISBN 9780980388527, AU \$55.00*

There are a large number of plants found on farms and bush blocks, along roadsides, in waste places and in gardens that are considered poisonous to livestock, domestic pets and people. The book will help you become more aware and familiar with these plants, most of which are of a weedy nature. It has been written for everyone, but especially for farmers, gardeners, bush walkers, pet owners, veterinary surgeons and parents.

The book uses easy-to-understand language with colour photographs to aid plant identification. It details who the plant is poisonous to, which parts of the plant are poisonous and the toxins that are likely to be encountered, as well as symptoms of poisoning. Symptoms are also listed according to plant species and animal in a comprehensive and informative appendix. All the plants in this book are found in Australia.

Available from: [http://www.weedinfo.com.au/bk\\_itpp.html](http://www.weedinfo.com.au/bk_itpp.html)

## Conferences and Workshops

### **XVIII International Botanical Congress**

*23–30 July 2011*

*Melbourne, Vic.*

Congress themes include Systematics, evolution, biogeography and biodiversity informatics; Ecology, environmental change and conservation; Structure, development and cellular biology; Genetics, genomics and bio-informatics; Physiology and biochemistry; and Economic botany including biotechnology, agriculture and plant breeding. Keynote symposia under consideration include topics such as Climate change and adaptation; Evolutionary biology of land plants; Food production: challenges and solutions; Origins of Australian and southern flora; Plant biotic interactions (including plant–insect–fungi); Plant diversity and ecology; and Plant systematics in the 21st Century.

Further information: [www.ibc2011.com/Program.htm](http://www.ibc2011.com/Program.htm)

### **Ecological Consultants Association of NSW 2011 Annual Conference and AGM Impacts of Invasive Species**

*25 July 2011*

*Gosford*

This conference covers the ecology and control of a range of invasive species, including exotic grasses, aquatic weeds, myrtle rust, African Olive as well as fauna pests.

For further information see <http://www.ecansw.org.au/> or contact Amy, ECA Administration Assistant at [admin@ecansw.org.au](mailto:admin@ecansw.org.au), Phone 0418 451 488.

## Conferences and Workshops (cont.)

### The 2nd NSW Travelling Stock Routes Conference

28 July 2011  
Orange, NSW

The 2nd NSW TSR Conference aims to develop a practical management framework for the shared and sustainable use of Travelling Stock Routes, at a time when the TSR network is facing numerous serious threats. The conference will be a practical, participatory workshop style, followed by a dinner and networking opportunity. The conference is sponsored by The Grass Routes Initiative, National Parks Association of NSW and The Earth Welfare Foundation.

Further information contact: Kirstin Proft (02) 9299-0000 or [kirstin@npansw.org.au](mailto:kirstin@npansw.org.au)

### New Zealand Ecological Society Conference Ecology in the Heartland: Celebrating 60 years of the New Zealand Ecological Society

28 August - 1 September 2011  
Rotorua

The theme for the conference will be Ecology in the heartland: celebrating 60 years of the New Zealand Ecological Society. This conference will also incorporate the New Zealand Society of Plant Biologists Annual Conference. Symposia and themes include: Bryophyte Ecology, Ecology and Plantation Forests, Freshwater Ecology, Global Change Biology, Landscape Ecology, Mires and Wetland Science, Restoration Ecology, Plant Physiological Ecology and Volcanic Plateau Ecology.

Further information:  
<http://www.nzecologyconference2011.com>

### NSW Landcare Forum

5-7 September 2011  
Parkes

Parkes and District Landcare will host the 2011 Landcare & Catchment Management Forum from 5-7 September 2011. This year's theme is Thinking Differently – New solutions for old issues. The forum will attract delegates from all over New South Wales involved with all levels of Landcare from farmers and community representatives to industry and business professionals aiming to solve the problems of today with new ideas and approaches. It will enable Landcare and Catchment Managers to start to look more laterally at some of the big issues being faced and work on finding creative solutions.

Further information: [parkeslandcare.org.au](http://parkeslandcare.org.au)

### 23rd Asian-Pacific Weed Science Society Conference Weed Management in a Changing World

25-30 September 2011  
Cairns, North Queensland

The conference returns to Australia for the third time in 2011, supported by the Weed Society of Queensland (WSQ), the Council of Australian Weed Societies (CAWS) and the Asian-Pacific Weed Science Society (APWS). There will be presentations on the role of genetically modified organisms in weed management, climate change, water availability, biosecurity, population growth and the utilisation of weeds.

Further information: [www.apwss2011.com](http://www.apwss2011.com)

## ANPC Corporate Members

*ANPC gratefully acknowledges the support of the following corporate members*

**Albury Botanic Gardens, NSW**  
**Approvals and Wildlife Division,**  
**Department of Sustainability, Environment, Water,**  
**Population and Communities**  
**Australian National Botanic Gardens, ACT**  
**Botanic Gardens of Adelaide, SA**  
**Botanic Gardens Trust, NSW**  
**Centre for Plant Biodiversity Research**  
**Department of Environment and Conservation, WA**

**Dept of Sustainability and Environment, VIC**  
**ForestrySA**  
**Greening Australia, VIC**  
**Mackay Regional Botanic Gardens, QLD**  
**Redland City Council, QLD**  
**Royal Botanic Gardens Melbourne, VIC**  
**Royal Tasmanian Botanical Gardens, TAS**  
**Sydney Olympic Park Authority, NSW**  
**University of Melbourne, Burnley Campus, VIC**



# ANPC kicks off the first two workshops on *Managing Native Vegetation in Travelling Stock Reserves*

Sue Mathams

*Australian Network for Plant Conservation Inc., Canberra. Email: sue.mathams@environment.gov.au*

In May 2011 the ANPC ran its first two of six workshops on *Managing Native Vegetation in Travelling Stock Reserves* (TSRs). Held in Wagga Wagga and Bathurst the overall aim of these workshops is to improve biodiversity conservation on TSRs with a particular focus on box gum woodland, an endangered ecological community. Working with a number of stakeholders the ANPC developed the workshops to enhance the knowledge and skills of onground users and managers of TSRs. The workshops were attended by a number of TSR Rangers and managers from the Livestock Health and Pest Authority (LHPA). As the workshops also covered many aspects of remnant vegetation management in a rural environment it was also relevant to and drew participants from other sectors including landcare, local government, Office of Environment and Heritage, Department of Lands (DPI), Catchment Management Authorities, environmental consultants and interested individuals.

The workshops were for two days with the first day covering topics such as the history of TSRs, priority TSRs in the sheep wheat belt, biodiversity values of TSRs, landscape connectivity, grazing for biodiversity and available resources to assist managers. An important feature of the first day was the opportunity to discuss the issues raised and the networking opportunities. The second day involved visiting a reserve with a bird walk, a session on identifying the natural values and threats to the site and an introduction to some monitoring techniques. The afternoon involved a management planning session using the information gathered in the field to highlight an overall aim/vision for the reserve and exploring ways this

*'Excellent presenters and organisation'  
– Landcare group member*

*'Great course on determining natural assets,  
developing management plans and monitoring  
techniques' – workshop participant*

could be achieved and measured. Well done to all of those participants who stayed for the second day field trips out in the reserves in rather chilly conditions.

The formal and informal feedback from our workshop evaluation has been very positive, especially in relation to the quality of the presentations/presenters and the networking opportunities. For those attending who were not from the LHPA it was an excellent opportunity to learn more about the role of TSR Rangers. This included learning about some of the obstacles that they face for managing TSRs, such as juggling their TSR work with pest and animal health responsibilities. The ANPC would like to acknowledge and thank the NSW Environmental Trust (Environmental Education Grant) for assistance with funding the workshops. We would also like to thank all of the project partners for assistance with this first round of workshops and all of the presenters who donated their time! The ANPC will run two more TSR Workshops this year around September to October. If you would like more information about these please contact the ANPC Office 02 6250 9523 or email sue.mathams@environment.gov.au.

*Left: Wagga Wagga workshop participants at the Kyeamba TSR field trip.  
Right: TSR Rangers cook up a hearty breakfast for all participants at Kyeamba TSR after the bird walk.  
Photos: Sue Mathams*



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**For further information contact:**  
Australian Network for Plant Conservation  
GPO Box 1777  
Canberra ACT 2601, Australia

Ph: + 61 2 6250 9509  
Fax: + 61 2 6250 9528  
Email: [anpc@anpc.asn.au](mailto:anpc@anpc.asn.au)  
Website: <http://www.anpc.asn.au>